

DISTRO

092013 #108

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Do The i's Have It? >





**All
Charged
Up with
Motorola's
Droid
Maxx**

**Logo's
Terrapin
Teaching
Tool**

**Plus:
Q&A with
Head-Fi.org's
Jude Mansilla**



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09.20.13

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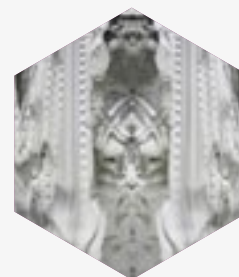
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SLOW AND STEADY WINS THE RACE

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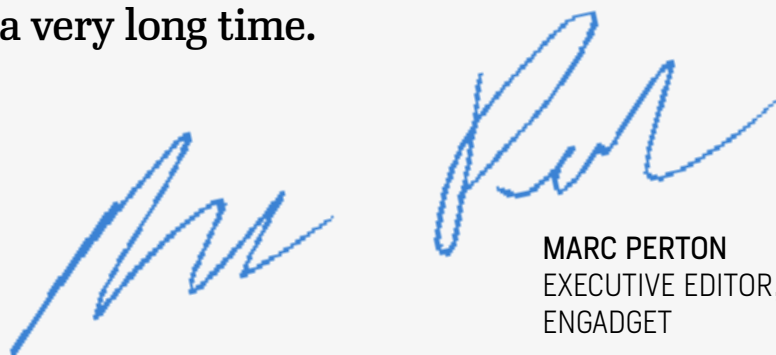
EDITOR'S
LETTER

In this week's Distro, we take a closer look at Apple's two new iPhones, the 5c and 5s. The 5c, despite being less impressive when it comes to features and specs, may actually be the more popular of the two models. As Myriam Joire says in her review, the pastel-hued phone is "a gorgeous handset that brings a breath of fresh air to the iPhone lineup. For many people, it might even be a better choice than the iPhone 5s." That, of course, doesn't mean the 5s isn't worth considering. In her review of Apple's new flagship model, Myriam declares it the best iPhone ever made and says that Apple "took a good product and made it better through hardware upgrades, new features and completely revamped software." If you have an iPhone 5, should you upgrade? You'll have to read the full review to find out.

Also in this week's Distro, we check in with audiophile and Head-fi.org founder Jude Mansilla. His favorite classic gadget? It's a tie between the Newton MessagePad and a portable CD player paired with a good set of headphones, which he says "started me on the journey that turned into Head-Fi.org."

This is my eighth Distro Editor's Letter. And my last. Next week, for Distro's final issue, Christopher Trout, who has ably managed Distro as its Executive Editor for the last two years, takes over to share his memories about this groundbreaking publication.

Although Distro will soon cease publication, its spirit will live on as part of Engadget. Features like "Time Machines," which this week highlights the Valiant Turtle, an '80s-era educational robot, will soon make their way to Engadget on a regular basis. The Turtle, which remained on the market for decades, was inspired by the programming work of Seymour Papert, co-founder of MIT's Artificial Intelligence lab. Like the Turtle, which survived its early roots as a science-based toy that was well ahead of its time, Distro's unique mixture of the kinds of technology stories you don't see anywhere else will continue on Engadget. Slow and steady wins the race, and like the Turtle, we'll be here for a very long time.



MARC PERTON
EXECUTIVE EDITOR,
ENGADGET



SMARTPHONE PLATEAU, TOOTH TECH AND DAT BATTERY!



Touch article names
to read full threads

DISTRO
09.20.13

INBOX



THE SECRET IS OUT
ISSUE 107,
SEPTEMBER 13TH, 2013

“The main problem is the volume of leaks occurring — without them we’d have had no clue regarding the 5c, the colours or the fingerprint scanner. Apart from the fingerprint scanner, the twice as fast processor, the motion processor, the camera and the colours, it’s exactly the same as the 5! ;) Not sure what people were hoping for — the phone remains gorgeous

with great software and hardware so what did people expect?”

— MOFS

“I remember that when the iPhone 4 came out, everyone was talking about it for weeks. It was on the front page of practically every publication for the first few days and then discussion continued for months afterwards. And then Apple’s competition got better. And people everywhere began to expect more from a phone. The thing is, we are entering that stage of technology where every processor speed bump, every new gig of RAM isn’t that impressive. High-density displays are found in all but budget phones. Multicore processors are now expected *even on* budget phones.

Most new features like fingerprint scanners and hover-touch feel like features intended to solve problems most people weren’t even complaining about. [It’s] almost as if companies feel like they need these things as an *excuse* to make a new phone, but most consumers just don’t care.”

— WHACKO

THE IPHONE 5C ISN’T YOUR
LOW-COST SOLUTION
ISSUE 107,
SEPTEMBER 13TH, 2013

“The cheap iPhone you have been looking for is on Craigslist... it’s been there for a while now.”

— TJDET

“iPhone 5c should have been \$49 on contract and 399 without.

It’s priced too high for what it is. It’s last year’s



hardware, cheaper materials and only \$100 less (on and off contract) than the newest one.”

— TEREKIDI

THE WARM EMBRACE OF THE MACHINE

ISSUE 107,
SEPTEMBER 13TH, 2013

“The one thing that people often forget about machines is the humans that created them. Ultimately it’s a tool, an extension, an expression of the knowledge of someone. Every machine that you interacted with probably had a team that created prototypes, refined the results, made it more suitable for its task. I like to think that every time a program I’ve written runs, someone is interacting with my mental clone. I’m also realistic about it though; every bit of knowledge that I have acquired was given to me by someone else. I am not just myself, I am a reflection of all who came before me and all of my peers, and so too are the machines that we find comfort in.”

— ESECASCO

NOKIA LUMIA 625

ISSUE 107,
SEPTEMBER 13TH, 2013

“Looks [like] a great mid-range phone to me, not so underpowered like the Lumia 515 or 521 and also not as powerful as a Lumia 920 or 1020. I’m also impressed it only has 512MB of RAM and it doesn’t lag on most WP apps. Great job Nokia and MS.”

— MOGUELANGELGIMENEZ

“I went to the dentist the other day. Good results. He took me to his MacBook and showed me the pictures and explained me everything. Seeing it on a screen instead of hearing it out of his mouth gave me a boost of confidence, not only in the machine, but in him. It was very comforting to know he was so on top of stuff and using tech to help him. People on top of the tech wave are in a completely different playing field than people who aren’t — in every industry. Humans and machines

working together are a killer combo in any field.”

— GOLDENRABBIT

LG G2

ISSUE 107,
SEPTEMBER 13TH, 2013

“DAT BATTERY!!!!”

— BIGDAVE

“I love black faced phones, however if you are going to make the bezel look like it’s integrated into the screen why would you put a logo on it?”

— OCTOSOCK



ENTER

EYES-ON

DISTRO
09.20.13

CHROME CITIZEN REFLECTIVE CAMO

100-FOOT
REFLECTION

BUCKLE
UP

STORE
IT

Tap for detail

CAMOUFLAGED REFLECTIVITY

A top choice for bikers and other on-the-go commuters, Chrome's stable of bags wield some of the better-designed goods in the category. The same is true for the Citizen messenger in Reflective Camo. In addition to its key visual trait, the bag is constructed from military-grade materials including Cordura and 18 oz. truck tarpaulin. Oh yeah, and it's made in the USA too.

THE DAMAGE: \$160

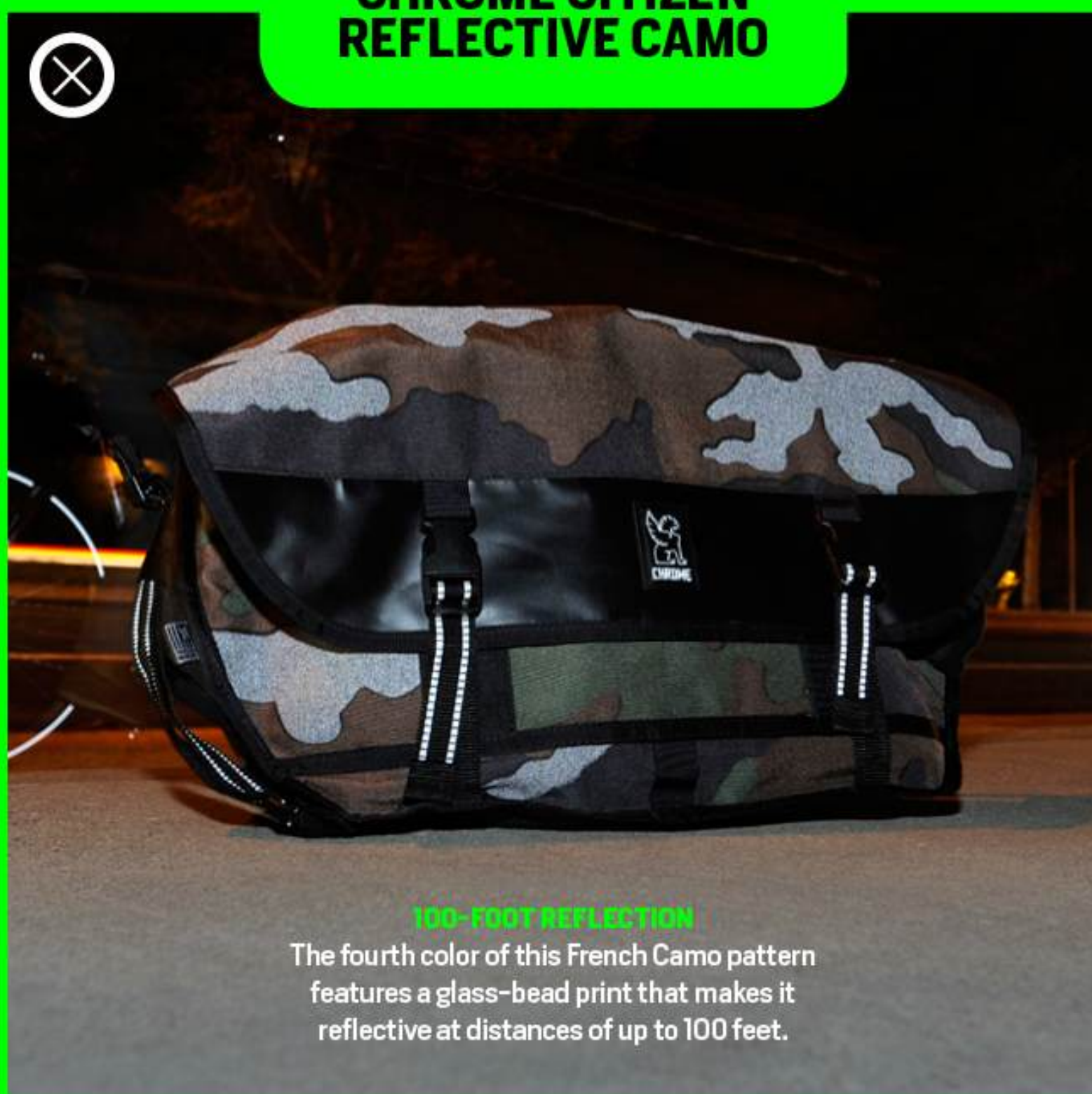


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EYES-ON

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CHROME CITIZEN REFLECTIVE CAMO



100-FOOT REFLECTION

The fourth color of this French Camo pattern features a glass-bead print that makes it reflective at distances of up to 100 feet.

PHOTOGRAPHS BY WILL LIPMAN



ENTER

EYES-ON

DISTRO
09.20.13

CHROME CITIZEN REFLECTIVE CAMO



BUCKLE UP

Chrome's iconic quick-release seatbelt buckle adorns the main shoulder strap with an integrated bottle opener for extracurriculars.

PHOTOGRAPHS BY WILL LIPMAN



ENTER

EYES-ON

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09.20.13

CHROME CITIZEN REFLECTIVE CAMO



STORE IT

Inside, compartments sort that daily carry and can safely stow up to a 17-inch laptop when called upon.

PHOTOGRAPHS BY WILL LIPMAN



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GIGABYTE BRIX GAMING PC

While we had an inkling that Gigabyte would be fitting its latest miniature BRIX PCs with Haswell processors, we were pleasantly surprised to learn it had also built a tiny gaming computer with Iris Pro graphics on board. Indeed, the BRIX pocket gaming PC has similar internals to the recently announced Gigabyte BRIX II — it has an HDMI port, Ethernet, four USB 3.0 slots, Bluetooth 4.0, a Mini DisplayPort, built-in WiFi and a headset jack — but with the add-

PRICE: TBD

AVAILABILITY: TBD

THE BREAKDOWN: THIS DIMINUTIVE GAMING PC STILL WIELDS IRIS PRO GRAPHICS AND HASWELL TO POWER INTENSE SESSIONS.

ed benefit of Intel's latest integrated graphics and the choice of red, yellow or black aluminum housing.

We had a chance to play around with a prototype model at the Intel Developer Forum in San Francisco, and we have to say we're impressed. We played a short round of *Grid 2* and the race car looked amazing as it roared across a large 1080p TV. While the performance appeared robust enough in our brief hands-on, an Intel rep did warn us it probably won't replace a system with a dedicated high-end GPU (Ed. note: We've heard from Intel that while Iris Pro won't replace a high-end GPU, it'll match up well with low- to mid-range graphics cards). The box itself is an adorable little thing that we felt was compact and light enough to bring to our next gaming party without taking up too much space in the trunk.

Availability and pricing for the tiny PC aren't set just yet, but a representative said it would cost somewhere around \$500. If that sounds surprisingly affordable, we should note that the BRIX is a barebones system, so you still have to supply your own memory, 2.5-inch SATA hard drive, operating system and gaming controller to make it work.



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PRICE: TBD**AVAILABILITY:
TBD****THE
BREAKDOWN:****ACER'S C7
CHROMEBOOK
SUCCESSOR
PACKS IN A
HASWELL
PROCESSOR
AND A LESS
UNIQUE NAME.**

ACER CHROMEBOOK

One of the first Chromebooks to come blessed with Intel's Haswell processor is the new Acer Chromebook, and we had a chance to get a closer look at it recently. If not for the "new" moniker that Acer has so kindly bestowed on it, at first glance you'd be hard-pressed to find much different in comparison to its C7 predecessor. Get closer however, and you'll notice it's lighter and slimmer, measuring around 0.75 inch thin and weighing in at about 2.76 pounds. The new Acer Chromebook also has much better battery life, boasting up to 8.5 hours of continuous use from

a non-removable cell this time around. It also sports an HDMI port, two USB ports (one 3.0), a standard headphone jack and an SD card slot on the sides.

The 11.6-inch, 1,366 x 768 resolution display is a little on the small side, but still looks crisp and colorful enough to our eyes. The raised chiclet keyboard feels tactile and comfortable to use, and Acer wisely chose to adhere to the standard Chromebook keyboard layout instead of recycling a PC layout like on the C7. While we don't know its price just yet, we do know that you'll get 100GB of Google Drive storage free for two years with every purchase.



ASUS TRANSFORMER BOOK T100



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ASUS already added new members to its Transformer family back at Computex, and at IDF 2013, the company added yet another, called the Transformer Book T100. It's got a 10.1 inch (1,366 x 768) IPS display, 31Wh battery, quad-core Bay Trail-T Atom CPU and runs Windows 8.1. There are 32 (\$349) and 64GB (\$399) storage options augmented by one free year of ASUS' WebStorage service and a microSD reader, plus 2GB of RAM to keep

PRICE: \$349-\$399

AVAILABILITY: OCTOBER 18TH

THE BREAKDOWN: THE LATEST 10.1-INCH TRANSFORMER BOOK WRANGLES WINDOWS 8.1 IN 32GB AND 64GB OFFERINGS.

things running smoothly. Connectivity includes micro-USB, micro-HDMI and a single USB 3.0 port in the detachable dock.

For the price, the T100 has some very solid hardware. While the whole chassis is constructed of plastic, the tablet portion has a glossy, metallic paint finish with vaguely visible concentric circles emanating from the centrally located chrome ASUS logo that harks back to the firm's Zenbook lid designs. Meanwhile, the dock is finished in a soft-touch paint, textured to feel like finished metal. Both halves of the T100 are solidly built, with zero flex in the keyboard deck or the tablet itself. We rather liked the soft finish of the dock, but the tablet portion, as you might expect, gathered fingerprints as easily as did the glossy screen.


During our brief time with the device, we found that the T100's key buttons have a surprising amount of travel, and we imagine they'll work well for plowing through emails. Given the lackluster performance of many Windows machine trackpads, we were also surprised to find that the T100's pad was glitch free — two-finger scrolling and regular mouse navigation went off without a hitch. Audio output from the stereo speakers was predictably tinny, but it could be cranked up to a fairly high volume.





HP CHROMEBOOK 14

Aside from the new Acer Chromebook, we also got a hands-on look at the new HP Chromebook 14. The latest Haswell-powered Chromebook from HP comes in an array of eye-popping colors — Snow White, Ocean Turquoise and Coral Peach — which certainly makes them the most colorful Chromebooks we've ever seen. In person, the colors seem bright and playful, though we can't help but feel they look like they belong in Toys R Us rather than an electronics store. The Chromebook's chassis is made out of plastic, which makes the whole thing seem even more toy-like. The top cover has a smooth, rubberized finish, but the plastic-molded keyboard feels a bit gritty; the texture reminds us of the material used in 3D printing.

As the name suggests, the Chromebook 14 has a 14-inch display with 1,366 x 768 resolution. It looked bright enough underneath the convention center's lighting, though it's difficult to tell after just a few minutes of use. It's certainly not the lightest Chromebook we've ever held — it measures about 0.81-inch thin and weighs in at a whopping 4.08 pounds. HP opted to adhere to the standard Chromebook keyboard layout instead of its own, and the trackpad has just a single button instead of the two found on the HP Pavilion 14. Other features include an HDMI port, 16GB of storage, USB 2.0 and USB 3.0 ports, an HD webcam, an SD card slot and a battery that promises up to 9.5 hours of continuous use. If you decide to buy one, it comes with 100GB of Google Drive free for two years. 

PRICE: \$299

AVAILABILITY:
LATE 2013

THE BREAKDOWN:
HP'S COLORFUL
CHROMEBOOKS
SPORT INTEL'S
LATEST ALONGSIDE
A 14-INCH DISPLAY.



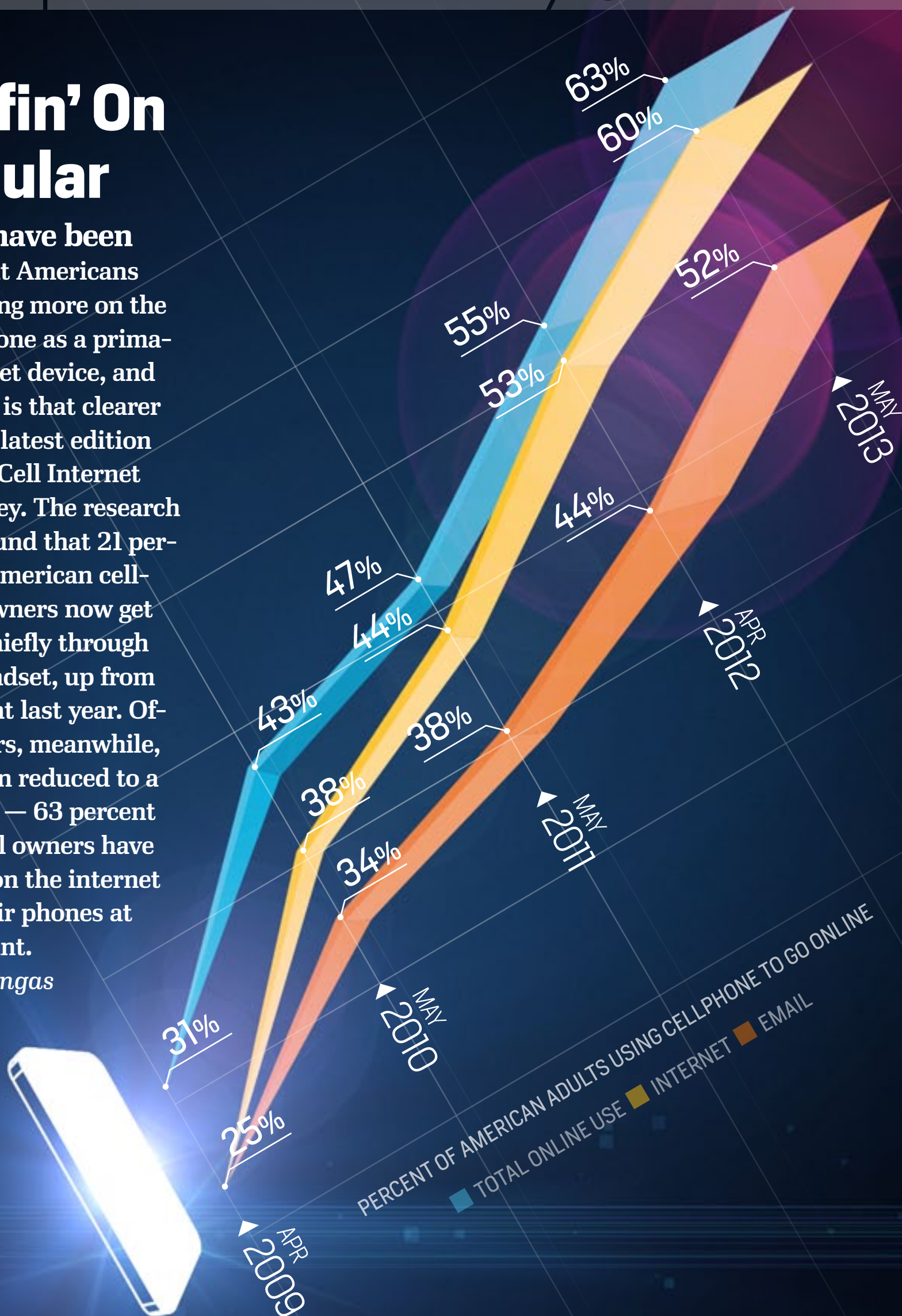
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Surfin' On Cellular

There have been signs that Americans are leaning more on the smartphone as a primary internet device, and nowhere is that clearer than the latest edition of Pew's Cell Internet Use survey. The research group found that 21 percent of American cell-phone owners now get online chiefly through their handset, up from 17 percent last year. Offline users, meanwhile, have been reduced to a minority — 63 percent of US cell owners have hopped on the internet from their phones at some point.

— Jon Fingas





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Nintendo's Secret Weapon

By Jason Schreier, *Kotaku*

Kotaku's Jason Schreier offers a rare look inside Nintendo's "Treehouse," the well-guarded operation at the company's Redmond headquarters that helps it bring its games from Japan to English-speaking audiences. As Schreier explains, that's an operation that's grown considerably since its earliest days, which date back to the somewhat simpler task of tailoring the British-developed *Donkey Kong Country* for US gamers. It's

also an operation that now handles a lot more than simply translating text, encompassing some 80

employees who are deeply involved in a game's development throughout the entire process.



It Takes a Village to Save a Hard Drive

By Ben Fino-Radin

Benfinoradin.info

On his blog, Ben Fino-Radin documents a recent effort at the New Museum to rescue some of Phil Sanders' early computer-generated art from the vintage hardware it's resided on for the last few decades. As you can imagine, that was anything but a straightforward process, requiring hardware to be disassembled and a "bucket brigade" to ferry floppy disks from an Apple IIe.

The iPhone's Secret Flights From China to Your Local Apple Store

By Adam Satariano

Bloomberg

By the time you read this, you'll be able to walk into an Apple store and buy a new iPhone 5c or 5s. Here, *Bloomberg's* Adam Satariano explains how the company manages to ship millions of devices around the world in secret ahead of a big launch like this week's. That includes chartered Boeing 777s that can each carry 450,000 iPhones at a cost of \$242,000.

The Obscure Cult Game That's Secretly Inspiring Everything

By Chris Kohler, *Wired*

A look at the legacy of the landmark PlayStation 2 game *Ico*, which was far from a runaway hit when it was first released, but has grown considerably in stature in the decade since — leading to Team Ico's own follow-up, *Shadow of the Colossus*, and inspiring countless other games with what lead designer Fumito Ueda describes as the game's "design by subtraction."

The Bizarre Evolution of the Word "Cyber"

By Annalee Newitz, *io9*

You don't have to look far to realize the word "cyber" has seen something of a resurgence; only now it's more commonly used as a prefix for war or security. In this piece for *io9*, Annalee Newitz traces the origins of the word and its rather complicated history, including comments from the likes of science fiction author Pat Cadigan and *Mondo 2000* founder R.U. Sirius.





TAP TO CONTINUE.

MICROSOFT'S MOBILE MONSTER



DISTRO
09.20.13

FORUM

SWITCHED
ON

BY ROSS RUBIN

ON SEPTEMBER 2ND, MICROSOFT announced that it would pay \$7.2 billion for Nokia's handset business, including its smartphones and Asha phones aimed at consumers in developing economies. Key personnel from that business, including Nokia's former CEO Stephen Elop, would be joining Microsoft and Nokia would now be a company that focused on location technologies (via its Here services) and wireless infrastructure (via NSN, for which it had purchased Siemens' share).

The move marked the exit of one of the most storied and, for many years, most successful mobile phone companies in history. It also marked Microsoft's entry into the handset market proper, taking an approach more aligned with Apple's than Google's. It's not only that it's the first time Microsoft has acquired a licensee, but it's also that it acquired one that had a dominant share of its licensing business in a device category.

Nokia shocked the world when it announced that it would embrace Windows Phone as its strategic smartphone

operating system, going so far as to note that there would be "no Plan B" should the initiative fail. (As *TUAW* lead blogger Michael Rose tweeted, "Plan 'B' ultimately stood for 'Buyout.'") Nokia's decision came down to four main justifications. It would be exceedingly difficult for Nokia to build an Android and iOS rival with MeeGo (true, as was demonstrated by webOS and BlackBerry 10). Google would not offer a way to include Nokia's location assets into Android (true since they were largely redundant or competitive). Microsoft





“Nokia invigorated Windows Phone with features such as colorful and solid polycarbonate shells that resisted scratches, Qi wireless charging ... and ultimately, the best camera ever shipped in a modern smartphone.”

would offer financial support to Nokia (which it did). And, finally, Android was the path to commoditization (possibly true given the consolidation we've seen around Samsung in that market, but not necessarily solved by Windows Phone or any other licensed OS).

Microsoft was willing to take locations and give loot, but needed something in return: exclusivity. Windows Phone was struggling in part because manufacturers were largely repurposing older Android platforms for it. (Although, in fairness to Samsung and HTC, Windows Phone's limited hardware support made using the latest and greatest components difficult.) Nokia invigorated Windows Phone with fea-

tures such as colorful and solid polycarbonate shells that resisted showing scratches, Qi wireless charging, free (and ad-free) cached personalized internet radio, displays that avoided washing out in the sun, optical image stabilization and, ultimately, the best camera ever shipped in a modern smartphone with the Lumia 1020. Impressively, it did all this while staying true to its pledge not to toy with the consistency of Windows Phone's user experience across devices for the good of the ecosystem.

These advances, tied with hard work in the US carrier channel, helped nudge Windows Phone's share up a bit, although some of those gains may have




“Microsoft had created a monster in its own ecosystem.”

come from the cool reception to new BlackBerry handsets as well as at the expense of other Windows Phones. Indeed, HTC bore the brunt of embarrassment as the multicolored Lumia 820 and 920 stole the thunder from its similarly brightly hued Windows Phone 8x and 8s.

When the smoke cleared, the mobile phone landscape had changed a bit. The Windows Phone landscape, though, had changed dramatically, with Nokia capturing more than 80 percent of Windows Phone sales from a struggling HTC and uninterested Samsung. Along the way, it had built out a full portfolio of handsets from the entry-level Lumia 520 to the flagship Lumia 1020. Microsoft had its bright spot. But a careful look at the kinds of things Nokia had done on Windows Phone showed clearly that there was nothing preventing it from doing any of those things on Android, where it could possibly capture even greater overall market share by tapping into a richer selection of apps. Microsoft had created a monster in its own ecosystem and was now at the mercy of Nokia, which now had the option to either leave Windows Phone as an exclusive handset maker or tell the company to hit the Live Tiles altogether. Perhaps Plan “B” actually stood for “Brinksmanship.”

Owning Nokia’s smartphone busi-

ness will be different for Microsoft than dipping its toe into the small Windows tablet business as the company did with Surface. For one, what happens to the things that Nokia did in software to differentiate, such as Nokia Music referenced earlier? Does it survive at all? Does it remain an exclusive feature? Or does it get incorporated into the Xbox Music platform and shared with all licensees of Windows Phone and Windows (and possibly even come to iOS and Android clients?). With Surface, Microsoft differentiated in hardware while staying with the stock Windows experience available to all its licensees. But Nokia knew that it needed more to compete with other handset makers both using and competing with Windows Phone.

With the passing of Nokia’s handset business, there are now (once again) no exclusive third-party licensees of Windows Phone. Before, Microsoft endured being part of the friction of two companies while one of them applied its brand and heritage to mobile hardware. Now, Microsoft will have to do all the heavy lifting itself without Nokia’s brand and as part of a much larger company. Microsoft has shown it’s been able to create a homegrown category leader in Xbox. But the games for its console are nothing compared to the game of global smartphone competition. 



EVERYTHING IS OVER- DESIGNED. EVERYTHING.



DISTRO
09.20.13

FORUM

THIS IS THE
MODEM WORLD

BY JOSHUA FRUHLINGER

I HAD A CONVERSATION with a friend today about the upcoming PS4 birth. We're both crazy excited about getting the new console come November. I mean, what's better than a brand-new box of electronics delivered via UPS on a sick day? Seriously, what's better? I'll wait.

As stoked as I am to take on the brand-new, fresh PS4, something looms in my mind based on years of watching my favorite wads of silicon eventually spoiled by marketers, salespeople and time. When a product first launches, it's pure, even innocent, like a newborn baby. The interface is well-researched, even quirky, and the manufacturer is compelled to leave it as it is: a cute little thing with tons of promise. One look at my PS3 today compared to what it was like when it launched confirms this.

Everyone loves an adorable baby. Eventually, it grows hair, sprouts a personality and turns into a complex

individual that begs pause. It might be a wonderful adult, but it's certainly not as simple and innocent and cute as its former self.

But electronics aren't people. So I have to ask: Why do we have to add stuff? Why can't we leave it as is? The original iPhone, as simple as it was, was just that: quick, easy to use and it just made phone calls and browsed the web. I still have mine and I turned it on the other day. No Retina display, no apps, no LTE, but it runs quickly and solidly, like an old truck with no electronics.

But now we have myriad apps, tons of push notifications that you can't turn



“... Devices end up as bloated, over-mature versions of their previous selves that imitate what we thought we wanted, but are, in reality, juiced-up athletes that ruin the game.”

off, productivity apps that beg you to get stuff done when you're just trying to capture what's happening around you and camera apps that promise to do more than what they're designed to do. It's... well, it's weird.


And what happened to the YouTube app? It used to just be a search field

and a video player. But now videos stick around, play in the background and won't go away until you swipe them. There's more stuff than there is video, and the last I checked, YouTube is supposed to be all about video.

Products get old and their manufacturers do whatever they can to keep them relevant via software updates and third-party support. What ends up happening, though, is they become a monstrosity of patches and tweaks that undermine the elegance of the launch version. It used to be that a gadget was just that: it did what it did and we either loved it or hated it.

But now, with firmware updates and our admittedly incessant need to get constant updates that reflect the latest trends in gesture whatsit, we've reached the point that devices end up as bloated, over-mature versions of their previous selves that imitate what we thought we wanted, but are, in reality, juiced-up athletes that ruin the game. When these sacred devices first hit the market, they were — assuming they were the good ones — optimized machines of glory that didn't care if market reception was cruising along at a steady pace. They just were.

Sometimes software updates and additions are good and necessary, but most of the time, they're chunks of fat that result in bloated devices that lose their magic and become obstacle courses filled with spam and opt-ins.

So, please excuse me as I go download iOS 7 for my old iPhone. 





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REVIEW

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**Motorola
Droid Maxx**



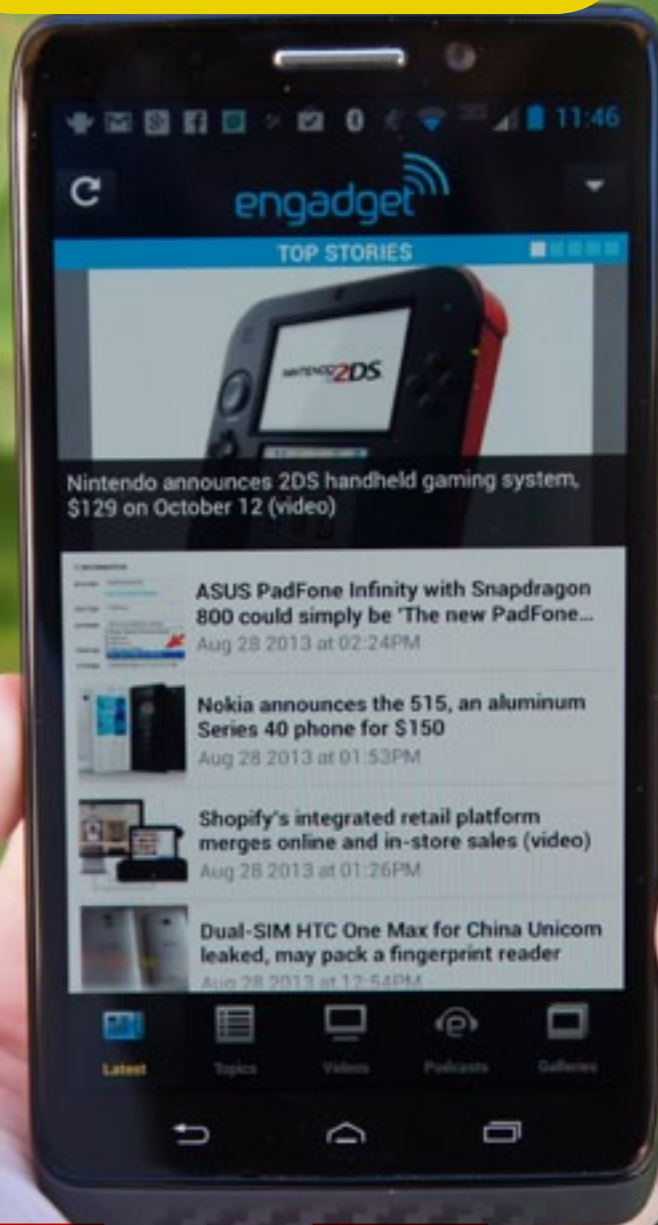
**iPhone
5c**



**iPhone
5s**



MOTOROLA DROID MAXX



Motorola's latest **Droid Maxx** lives up to the name and offers extended battery life, but is that stand-out feature alone worth the extra scratch?
By Brad Molen

Motorola's Droid phones tend to arrive in packs. The original Droid RAZR was released just a couple months before the Droid RAZR Maxx — essentially, the RAZR with a larger battery. The next year, the company followed up with the Droid RAZR HD, the RAZR M and the RAZR Maxx HD, the latter of which promised longer battery life. Then, after a long silence, the OEM finally broke its silence this past July. At a press event co-headlined by Verizon, Motorola announced its first products since being acquired by Google, once again choosing to launch three



devices. We've already taken a look at the Droid Ultra, and in this review we'll focus on the largest of the trio, appropriately called the Droid Maxx.

Despite the fact that all three offer roughly the same mid-range specs, the Maxx stands out from the rest of its siblings thanks to its build, wireless-charging capability and — surprise! — its larger battery. But are these three factors important enough to justify paying \$300 on-contract, when the Moto X, Droid Ultra and other flagships all cost \$100 less? Let's find out.

HARDWARE

In our review of the Droid Ultra, we concluded that there was no logical place for it in Verizon's lineup. Fortunately that's not the case with the Droid Maxx: it looks better, adds a few new components and just feels better-made. Where the Ultra featured a glossy, fingerprint-friendly plastic casing over a thin layer of Kevlar fiber, the Maxx makes use of a soft-touch finish instead. It's easier to grip, gives the phone more of a premium feel *and* masks fingerprints, to boot.

Just like the other two Maxx phones, this guy's distinguishing feature is its larger, 3,500mAh

battery. It's a significant difference when you compare it to the 2,130mAh pack inside the Ultra, and yet it still fits neatly in an 8.5mm-thick frame. In fact, the Maxx is only a hair thicker up top than the Ultra, though it doesn't get much narrower as you approach the bottom, which is probably why Motorola was able to squeeze in that bigger cell. This gives us a lot more hope for battery life in future handsets; Moto has now proven that a thin phone can still deliver stellar runtime, so there's no reason other companies can't learn to do the same.

On the back, the Maxx borrows the same Kevlar pattern Motorola used in the RAZR Maxx HD. The rest of the phone's rear is arranged just like the Ultra: it has a 10-megapixel ClearPixel camera near the top, with the LED flash on the left and speaker grille on the right. You'll also see the Droid logo just beneath,

The Maxx fits a 3,500mAh battery into its still slim shell.





The soft-touch finish was a good move for this handset.

with the signature Verizon checkmark near the bottom, and the circular M logo closer to the middle. Flip the phone over and you'll once again be instantly reminded of the Ultra, as the two devices look identical from the front. The 5-inch AMOLED panel is there, along with a 2-megapixel, front-facing cam and earpiece on top, as well as three capacitive buttons and a small chin below the display. Unsurprisingly, the sides and edges all match up too: 3.5mm headphone jack on top, micro-USB port on the bottom and a volume rocker, nano-SIM tray and power button on the right. Curiously, this is the only part of the Maxx hardware that doesn't feel properly executed; the but-

tons jiggle more than they do on the Ultra.

In addition to the bigger battery and better feel, the Maxx also benefits from double the internal storage (32GB versus 16GB on the Ultra). The Maxx also supports Qi inductive charging, a feature that should have been included in the Ultra. Aside from these differences, the Maxx and the Ultra are otherwise identical. In other words, it's only worth forking over the extra \$100 (over the Moto X and the Ultra) if you feel strongly about those few differentiators.

The display on the Maxx is the same size, panel type and resolution as on the Droid Ultra: this is a 5-inch, 720p AMOLED affair. This means you'll have



more-saturated colors than a standard LCD and still have decent viewing angles, though screen brightness in daylight could be better. We'd prefer a 1080p panel on a \$300 (on-contract) device, but the screen here is still acceptable, and we're guessing few people will care that it's not higher-res.

As for connectivity, the Droid Maxx comes with the usual set of CDMA and Verizon-friendly LTE bands (700 / AWS, to be specific), as well as quad-band 42 Mbps HSPA+ (850 / 900 / 1900 / 2100) and quad-band GSM / EDGE (850 / 900 / 1800 / 1900) for international travelers who want to use a local nano-SIM. The phone is unlocked, so we were able to use the Maxx on HSPA+ with an AT&T SIM.

SOFTWARE, CAMERA AND PERFORMANCE

While the Droid Maxx brings a few welcome hardware improvements, the software experience is identical to what we saw on the Droid Ultra, so check out our review of that device for a thorough rundown of the UI and added features. In fact, Active Display, Touchless Controls and Droid Zap are present on all three of the new Droid phones, en-



On the back are a 10MP camera, LED flash and speakers.

suring you get the same user experience across the board. Yes, this means you'll have the usual Verizon-branded bloatware, but you can at least disable most of these programs and put them out of sight. In short, then, spending an extra hundred dollars won't get you any features not already offered on the Ultra.

The same can be said about the Maxx's camera and everyday performance, so we won't take up too much time discussing them here. To recap, though, this has the same 10-megapixel ClearPixel camera, RGB sensor, f/2.4 aperture and 1.4μ pixel size, and the whole setup is just as inconsistent here as on the Ultra and Moto X. Under the hood, the phone makes use of Motorola's X8 architecture, which features a 1.7GHz dual-core Snapdragon S4 Pro chip, a quad-core Adreno 320 GPU clocked at 400MHz and two additional



cores for natural-language processing and contextual computing. In a nutshell, the Maxx is more than adequate for most people's needs; only demanding power users will feel like they need a Snapdragon 800 instead. Of course, we'll never turn down extra computing power, and a device this expensive *should* have top-of-the-line specs, but nonetheless, the X8 will be sufficient for 99 percent of potential users.

Lastly, Motorola has always been a leader in call quality, and the Droid Maxx is no exception. All of our conversations were clear, and we didn't suffer any dropped calls, either. Additionally, the audio here is impressively loud; we never needed to crank the volume up to its full capacity, even when we were listening from the other side of a large room.

BATTERY LIFE

Since the Droid Maxx's main differentiating factor is its battery life, we're dedicating a full section to it. To recap, the Maxx features a 3,500mAh cell, up from 3,300 in the two previous models, making it the largest battery currently offered on any smartphone. Motorola claims you can get up to 48 hours of "mixed usage," but we never take a manufacturer at its word — not only do companies tend to offer best-case numbers, but also the term "mixed usage" isn't even well-defined. Because battery life is arguably the number one reason you might want to buy the Maxx,

we ran a few extra tests in addition to the ones we usually do. For the sake of comparison, we also ran several of the same tests on Motorola's other new devices: the Droid Ultra, Droid Mini and Moto X.

Before we delve into hard numbers, though, we first want to share our experience using the Maxx in the real world. For the purposes of testing, we used the phone in two different ways. Our first test included a lighter weekend workload — e.g., checking emails, watching a few YouTube videos, surfing the web, reading long-form content and using social media. With that kind of use, we hit the

The Maxx managed two-plus days of uptime.



48-hour mark with 4 percent charge remaining (that was with 4.5 hours of total screen-on time). Our second test pushed the Maxx at much heavier workloads. Basically, we relied solely on the Maxx for all our mobile needs, including mobile hotspot tethering for a couple hours, listening to Google Play All Access for three hours and navigating to several meetings in the city using GPS along the way. And, of course, there was constant email interaction and plenty of multitasking to keep the phone busy. After all this, the Maxx died after 18 hours and 54 minutes, with nearly five hours of screen-on time. This was a nice change from the Ultra, which cut off after 13 hours of heavy use.

Next we ran our standard video rundown test, which consists of looping an HD video at half-brightness. In that scenario, the Maxx held out for 13 hours and five minutes, a three-hour improvement over the RAZR Maxx HD. In contrast, the Droid Mini lasted 6:13; the Ultra lasted 7:50; and the Moto X only eked out 5:01. Talk time on the Droid Maxx lasted for 24 hours and 15 minutes; in comparison, the Droid Mini made it through 15 hours and 45 minutes. Finally, the Maxx lasted seven hours and six minutes through a browser test in which we cycled through several different popular websites — this handily bested the others by no less than two hours.

These numbers are great, but does it hold the title for longest battery life in the market? We would have said yes until

this past week, when we discovered that the LG G2 — with its smaller, 3,000mAh battery — actually lasts longer in real-world use *and* our standard video run-down test. Both deliver amazingly long runtime, so it's likely you'd be happy with either, but as you'll see, battery life isn't the only thing you should be considering as you make your decision.

THE COMPETITION

Not many smartphones cost \$300 on-contract in the US, but it seems to be a traditional starting point for Verizon's Maxx handsets: both of the Droid Maxx's predecessors launched with the same MSRP. It's also how much you've had to pay (at launch) for the Lumia 1020, the 32GB Samsung Galaxy S 4 and any 32GB iPhone (including the forthcoming 5s). So it's not as lonely at the top as you might expect. But does that really help justify the cost?

Normally we would say you get what you pay for in battery life — and don't get us wrong, we're extremely happy with how long the Maxx lasts — but as the LG G2 recently proved, you can be just as satisfied with a \$200 phone. Meanwhile, the Maxx doesn't bring anything else to help justify the additional cost, so the only people who will want to fork over more money are folks who love the near-stock OS, Motorola's clever new features *and* need the epic battery life. If these things don't matter much to you, you might as well go with a less expensive flagship.





The Moto X and the recent Droids line up for a group photo.

WRAP-UP

In our review of the Droid Ultra, we concluded that the device didn't need to exist in Verizon's lineup, not with the Moto X also on sale, anyway. We can't say the same of the Droid Maxx, though: its larger battery, superior build quality, wireless-charging functionality and increased storage make it a worthier purchase. Really, the Maxx is exactly what the Ultra should

have been in the first place, and it's proof that you can fit a huge battery in a thin chassis.

The only thing we can't swallow is the price. At \$300, there's only one group of people that will choose this over \$200 flagships: heavy users who absolutely need the epic runtime and prefer not to carry an external backup battery. This device will suit that

demographic perfectly, but even then, we can think of at least one device that offers battery life *and* better components for \$100 less. So, while the Maxx's existence is at least justified, the price is not. **D**

Brad is a mobile editor at Engadget, an outdoorsy guy, and a lover of eccentric New Wave and electro. Singer and beatboxer.

BOTTOMLINE

MOTOROLA (VERIZON) DROID MAXX

\$300
(ON CONTRACT)



PROS

- Great battery life
- Solid build quality, thin frame
- Good overall performance
- Supports wireless charging

CONS

- Expensive for what it is

BOTTOMLINE

The Droid Maxx has excellent battery life and is generally a solid mid-range device. Still, it doesn't offer enough to justify its \$300 on-contract price.



iPhone 5c



The **iPhone 5c** gets a fresh, colorful face-lift over its predecessor the 5, but will look, incremental improvements and a subtle price drop bring new buyers into the iOS fold?
By Myriam Joire

After weeks of leaks and speculation, the iPhone 5c is finally here. Apple's colorful new lower-cost handset slots below the iPhone 5s flagship and ships with iOS 7. This is the first time the company's launched two new iPhones simultaneously. The 5c replaces the iPhone 5 in the middle of the lineup, and the 8GB iPhone 4s is now available free on contract. Unlike years past, the iPhone 5 doesn't carry on as a second-tier device — it's just gone. The 5c is built from steel-reinforced, colored-through, machined polycarbonate that's coated in a glossy finish.



Apple's last plastic handset was the iPhone 3GS in 2009, but it only came in black and white. In contrast, the 5c arrives in a rainbow of pastel hues: white, pink, yellow, blue and green, along with a matching set of cases.

Spec-wise, the 5c is basically an iPhone 5 with an improved front-facing camera and support for more LTE bands. The 16GB model costs \$99 with a two-year commitment (\$549 unlocked) and the 32GB version is \$199 on contract (\$649 unsubsidized) — as such, it's more affordable than the departed iPhone 5. While Apple's clearly positioning the 5c as an aspirational product, we suspect it's also less expensive to manufacture than the iPhone 5,

which means the company gets to enjoy some higher profit margins. It's obviously not the cheap iPhone some folks were expecting, and frankly, we're not surprised — it's an Apple device, after all. So does the 5c live up to the hype? Is it an improvement over the iPhone 5? Should you pony up for iPhone 5s instead? Let's find out.

HARDWARE

We're not going to lie. The iPhone 5c is gorgeous — we'd even argue that it's the most beautiful iPhone since the 4 and 4s. It instantly makes the iPhone 5 and 5s look staid in comparison. Sure, we

prefer materials like aluminum and glass over plastic,

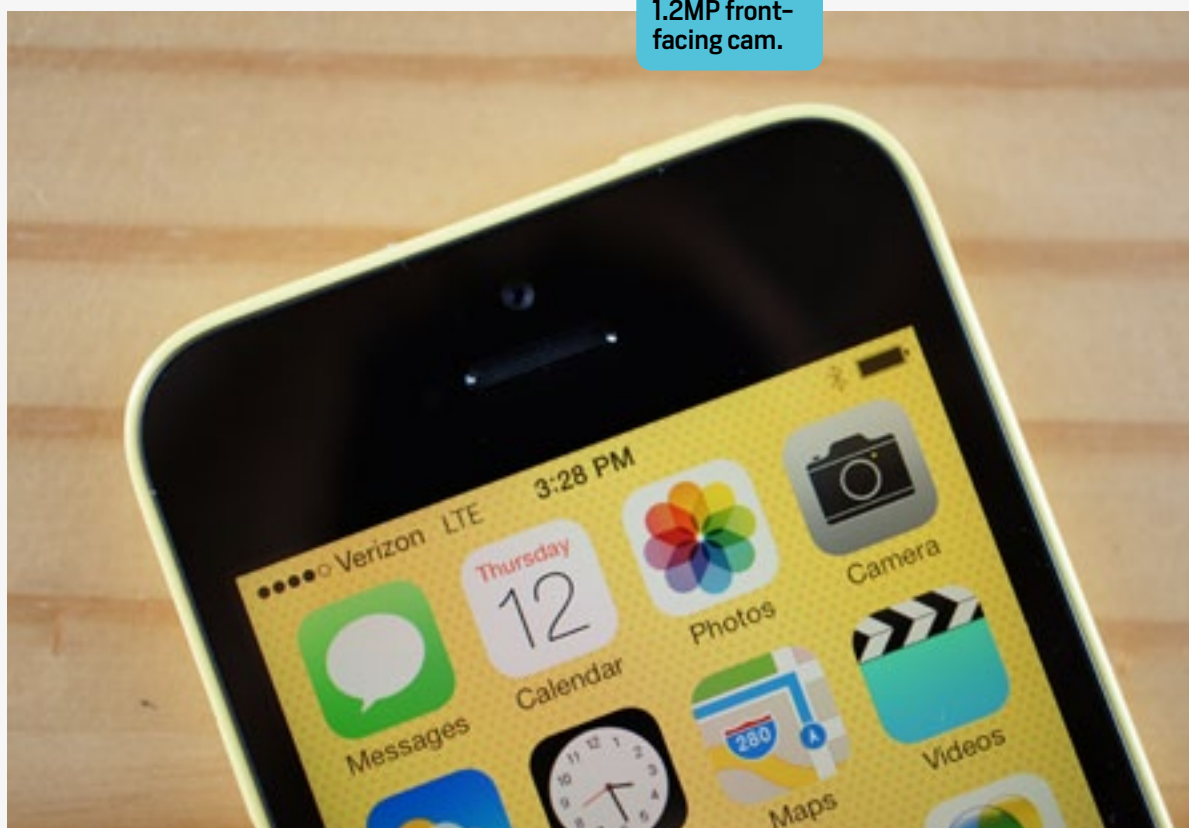
The 5c in its steel-reinforced glossy color coating.



and we appreciate the intricate craftsmanship that goes into building the iPhone 5 and 5s, but still, we can't help it — the 5c just triggers some reptilian part of our brains that screams, "OMG, color!" It brings a breath of fresh air to the iPhone lineup and will appeal to consumers at an emotional level. As such, we predict the 5c is going to be wildly popular this holiday season.

Apple's not the first company to design a handset using colored-through, machined polycarbonate. Nokia did it with the N9 and several Lumias — most recently the 1020 — and HTC did it with the One X. Indeed, with those devices, both manufacturers showed that plastic could be used to craft highly refined products with superior build quality. Now, the iPhone 5c takes that concept one step further with a steel-reinforced shell covered in an ultra-shiny finish.

Your selfies get an improved 1.2MP front-facing cam.



While some of Nokia's aforementioned models also feature a glossy coating, the surface of the 5c is even smoother — like enamel. This, combined with an extremely rigid structure, makes the 5c feel like a solid block of ceramic.

The iPhone 5c is slightly thicker, taller and wider than the iPhone 5 and 5s, measuring in at 124.4 x 59.2 x 8.97mm (4.9 x 2.33 x 0.35 inches). And at 132g (4.65 ounces), it weighs a little more as well (the 5 weighed 112g, or 3.95 ounces). The general shape and layout of the ports, controls and sensors are all identical too, but the chamfered edges have been rounded off, making the 5c especially comfortable to hold. While it's heavier, it also feels more substantial. All told, between the design and the pastel colors, we can't help but be reminded of Nokia's Lumia 620 and the HTC First.

In front, the iPhone 5c is all glass with an improved 1.2-megapixel front-facing camera, ear-piece and sensors above the screen and the home button below. The Retina display is the same excellent 4-inch, 1,136 x 640-pixel (326-ppi) IPS panel that's used on the iPhone 5 and 5s. As ever, it's bright with accurate colors and



wide viewing angles. Flip the handset over and you'll see the familiar iPhone layout, with the rear shooter, secondary mic and single LED flash clustered in the top-left corner. It's the same 8-megapixel camera (BSI sensor, f/2.4 AF lens) under sapphire glass that debuted with the iPhone 5 last year. Apple's logo adorns the top tier of the back and the word "iPhone" and regulatory info occupy the bottom tier.

Taking a look at the sides, there's a power / lock key on top, a nano-SIM tray on the right plus the silence switch and rectangular volume buttons on the left. The bottom is home to a standard 3.5mm headphone jack, primary mic, Lightning connector, speaker and two screws. Unlike the iPhone 5 and 5s, which hide the speaker and mic behind two rows of small holes, the iPhone 5c features four larger holes over the speaker, and just a single one covering the mic. Under the hood is the same Apple A6 processor (1.3GHz dual-core CPU and PowerVR SGX 543MP3 GPU) with 1GB of RAM found inside the iPhone 5. Our review unit was the 32GB model, but the 5c is also available with 16GB of built-in storage.

Besides the usual dual-band 802.11a/b/g/n, Bluetooth 4.0 and aGPS / GLONASS radios, the iPhone 5c handles a whopping 13 LTE bands. In fact, the 5c and 5s are the first handsets we've ever used that support all four major US carriers out of the box. In total, there are four SKUs: A1532 for the US (AT&T,

T-Mobile and Verizon), A1456 for the US (Sprint) and Japan, A1457 for Europe and A1530 for Asia / Australia. Both US versions support penta-band (850 / 900 / 1700 [AWS] / 1900 / 2100) UMTS / HSPA+ / DC-HSPA (42 Mbps), while the other two lack AWS. All models also include a quad-band GSM / EDGE radio. Our device (A1456) is unlocked — it came with a Verizon SIM, but also worked fine on AT&T's network.

CAMERA

As you probably guessed (notice a theme here?) the iPhone 5c inherits the rear camera from the iPhone 5. It's the same 8-megapixel BSI sensor, five-element f/2.4 AF lens (with hybrid IR filter), sapphire glass cover and single LED flash as last year. While that's a solid foundation, iOS 7 brings a bunch of new functionality to the table, including real-time filters, a square format and 3x video zoom — along with a much welcome UI refresh. The 5c also gains the improved 1.2-megapixel front-facing shooter (BSI sensor with 1.9µm pixels) found on the iPhone 5s. Compared to Apple's flagship, the 5c lacks 120 fps, 720p slow-motion video capture, 10 fps burst mode with real-time analysis, auto-exposure during panoramas, auto image stabilization and the True Tone flash.

The new iOS 7 camera app features a much cleaner and simpler layout. First, the viewfinder finally shows a preview of the entire area (not just a crop with the wrong aspect ratio), so composing





The iPhone's legacy of quality snaps continues with the 5c.

shots is a lot easier. Second, there are no more overlays cluttering the viewfinder. When looking at the screen in landscape, the app groups the controls on either side of the viewfinder, with the front / rear camera switch, HDR toggle and flash menu to the left, and the mode selector (pano, square, photo and video), filter button, shutter key and gallery shortcut to the right. The touch-to-focus, pinch-to-zoom and the AE / AF lock functionality remain unchanged, but holding down the shutter key now shoots multiple photos in a row. It's like a basic version of the burst mode on the iPhone 5s.

So how does the iPhone 5c shooter fare? It produces lovely pictures with lots of detail, vibrant colors, accurate exposure and proper white balance. Panoramas are particularly impressive. Best of all, it does this consistently — anyone can take great photos with the 5c, something we can't say about every other device. Of course, camera modules have come a long way since the iPhone 5 was launched. As such, low-light performance is only decent up to a point, beyond which pictures suffer from excessive noise. The 5c records video in HD at 1080p / 30 fps with mono audio. Video quality is ex-



cellent (files are encoded at 16 Mbps), but there's no continuous autofocus, so you'll have to tap the display to refocus. On the bright side, though, the front-facing camera works better in low light, which means nicer selfies for all.

PERFORMANCE AND BATTERY LIFE

As we mentioned, the iPhone 5c shares its internals with the iPhone 5, so it comes as no surprise that Apple's colorful new handset feels just as fast as its predecessor. In short, everything's smooth and responsive. The benchmarks confirm this — we tested the 5c alongside the iPhone 5s and iPhone 5 all running iOS 7, plus a second iPhone 5 with iOS 6. As you can see in the table, the results for the 5c and iPhone 5 are nearly identical. There's a slight

bump in speed from iOS 7 in some cases and, of course, the iPhone 5s is in a different league, often showing twice the performance of the 5c. Other than playing resource-intensive games like the new *Infinity Blade III*, we think most people will be completely satisfied with the 5c.

It's the same story with battery life. The iPhone 5c lasts about as long on a full charge as the iPhone 5. According to Brian Klug at *Anandtech*, the 5c incorporates a 1,507mAh battery — a modest boost over the 1,440mAh cell in the iPhone 5. Getting a full day of heavy use from the 5c is relatively trivial, and we even managed to squeeze two days of light use out of it — think intense day working on the go versus a quiet day lounging at home. We spent almost four

BENCHMARKS	iPhone 5s	iPhone 5c	iPhone 5
SUNSPIDER 1.0.1 (MS)	418	754	797
GLBENCH 2.7 T-REX HD OFFSCREEN (FPS)	23	6.5	6.5
BASEMARK X (ONSCREEN / OFFSCREEN)	27.7 / 16.7	18 / 7.5	17.7 / 7.1
3DMARK ICE STORM UNLIMITED	13,729	N/A	5,442
GEEKBENCH 3.0 (MULTI-THREAD)	2,562	1,218	1,301
LINPACK	795	479	501

SUNSPIDER: LOWER SCORES ARE BETTER. LINPACK SCORES TAKEN ON AVERAGE. IPHONES TESTED ON iOS 7.0.



solid hours using the handset (most of it with the screen turned on at maximum brightness) while shooting our video review and the battery still registered 40 percent capacity at the end. In our standard battery rundown test — looping a video from a full charge with the brightness and volume set to half, WiFi enabled (but not connected) and Bluetooth turned off — the 5c ran for 10 hours and 39 minutes vs. 10 hours and 50 minutes for the iPhone 5s and nine hours and 17 minutes for the iPhone 5.

We didn't experience any issues with reception or call quality — the iPhone 5c sounds loud and clear even in noisy environments. Compared to the iPhone 5, the 5c features a speaker that's slightly boomier and a bit louder at maximum volume. We listened to a variety of music on the 5c through Beyerdynamic DT 990 Pro headphones and Etymotic Research hf3 earphones. Audio quality is top-notch — it's something Apple's always done right, and other manufacturers are only now paying attention to (the HTC One and LG G2 come to mind). Data speeds hovered around 10 Mbps down and 6 Mbps up on Verizon's LTE network in and around San Francisco — 6 Mbps down and 3.5 Mbps up on AT&T inside our office with a 75 percent LTE signal.

SOFTWARE

There was a lot of brouhaha in tech circles after Apple previewed iOS 7 at

WWDC — moans and groans about the colors, iconography and typography. While we weren't averse to the new design, per se, we wanted to reserve judgment until launch. Well, after using iOS 7 for a few days, it's hard to imagine going back to iOS 6.

In iOS 7, which comes pre-loaded on the 5c and the 5s, skeuomorphism is out (finally!) and flat is in, but unlike Windows Phone and other flat UIs, iOS 7 restores some depth with layers,

Pre-loaded on the 5c, iOS 7 kicks the colors up a notch.





The chamfered edges of the 5 give way to roundness.

translucency and even parallax. It looks amazing, especially on the colorful iPhone 5c, and shows what's possible when hardware and software are designed as one.

iOS 7 will immediately feel familiar and comfortable to anyone who's used iOS before. That's because the mechanics are by and large identical. Most controls and other UI elements are in the same place and behave just like before. It's the cosmetics that have been reworked, with new fonts (Helvetica Neue, mostly), icons, colors (bright pastels), graphics and even gestures. Apple's core apps also benefit from these changes and are better for it. There's a lot to write about and indeed, we'll

have a full iOS 7 review to share with you in the coming days. In the meantime, let's take a look at some of the new features.

First, the keyboard's been updated with a new look and Spotlight's easier to access by simply tugging down on any home screen panel. Folders now support multiple panels and hold even more apps. Siri's no longer in beta and includes an additional (male) voice. In case you couldn't tell, we're pretty enchanted with the parallax effect in the new dynamic wallpapers — it's clever.

Still, our favorite addition to iOS 7 is Control Center. Swiping up from the bottom of the screen brings up a panel that contains toggles for WiFi, Blue-



tooth and other settings; sliders for brightness and volume; media playback controls; buttons for AirDrop / AirPlay; and shortcuts to the camera, timer and more (there's even a flashlight). At last, no more drilling through the settings menu. Seriously, folks, we've been waiting years for this.

Moving on, Apple also revamped multitasking in iOS 7 with a card-based UI that manages to recall webOS, Windows Phone *and* HTC's Sense 4. In a nutshell, recent apps are represented by screenshots on cards. You can scroll through them by swiping left or right; to dismiss an app, just swipe its card up and away. What can we say? It's fast, intuitive and a huge improvement over multitasking in iOS 6.

The music app, meanwhile, gains new functionality with iTunes Radio. It's a lot like Pandora, but right within Apple's ecosystem. You create stations for your favorite artists and fine-tune each station for hits, variety or discovery. The app lets you pause playback, rate songs and skip tracks (up to six times per hour). It sounds great and we didn't have any problems streaming iTunes Radio while driving.

AirDrop's also worth a mention. Like its counterpart in OS X, it enables easy file sharing over WiFi and Bluetooth. It only works between iOS 7 devices right now and supports URLs, photos, videos and more. AirDrop is available in the Control Center and from the share menu in most apps.

THE COMPETITION

Here in the US, the 16GB iPhone 5c is priced at \$99 with a two-year contract on AT&T, Verizon and Sprint, and \$549 unsubsidized on T-Mobile and SIM-free (unlocked). T-Mobile also offers the 5c for free upfront with 24 installments of \$22. The 32GB version costs \$199 and \$649, respectively. In comparison, the 16GB iPhone 5s starts at \$199 / \$649 and the 8GB iPhone 4s is now free on contract and \$450 unsubsidized.

As such, the 16GB iPhone 5c competes directly with the HTC One mini, Lumia 925 and LG Optimus G Pro on AT&T; Droid Mini, Galaxy S III and Lumia 928 on Verizon; plus the Galaxy S 4, Moto X and HTC One on Sprint. T-Mobile doesn't offer anything nearly as compelling as the 5c for free with installments, but you can purchase an unsubsidized Galaxy S 4, LG G2 or HTC One for just a few more dollars (\$604, to be exact).

WRAP-UP

With the iPhone 5c, Apple's crafted something that's more than just the sum of its parts. It's easy to be cynical and dismiss this handset as just an iPhone 5 in a colorful plastic shell, but that's missing the point. There's no doubt that the 5c looks gorgeous and feels wonderful in hand. It inherits tried-and-true features from the iPhone 5 and also gains a few new ones, like the improved 1.2-megapixel front-facing camera. Still, that's only half the story. It's iOS 7 that truly sets the 5c (and the iPhone 5s) apart, thanks



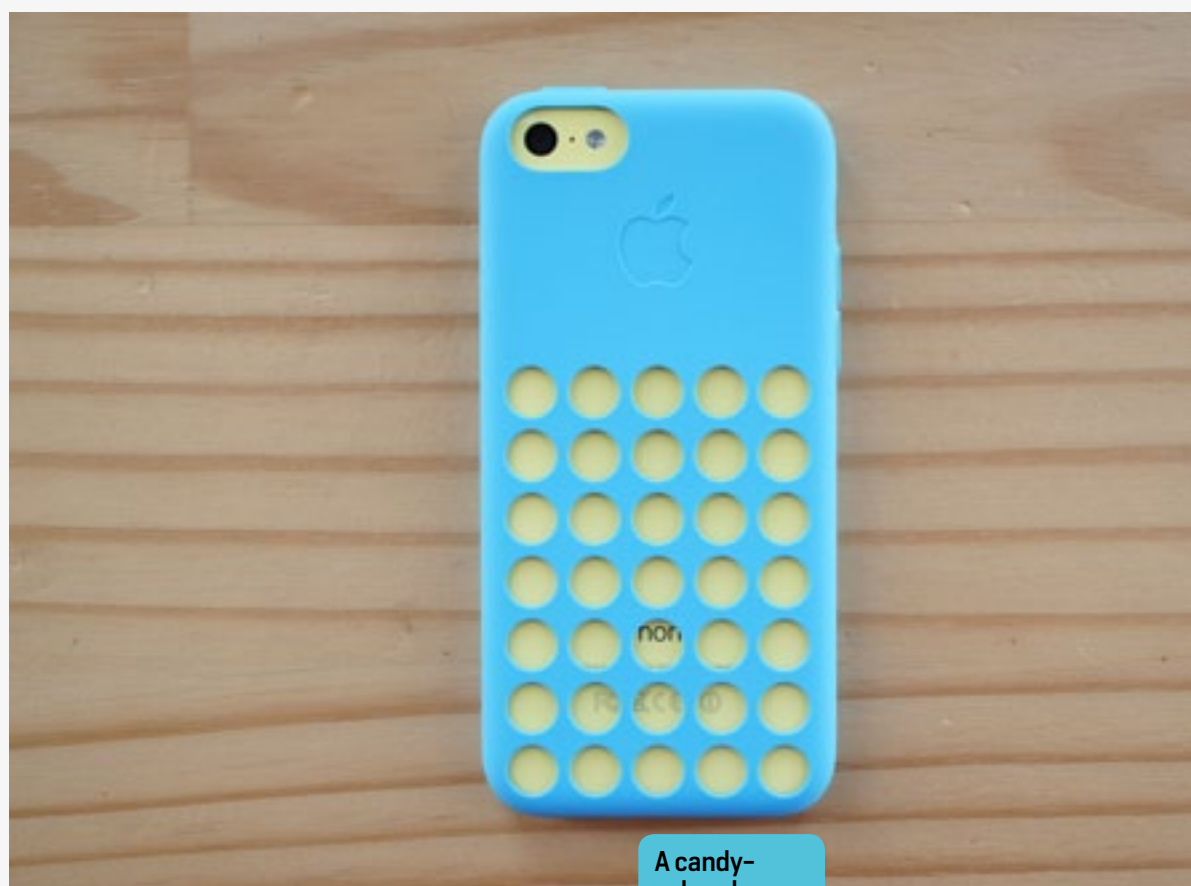


All the iPhones 5c gathered for a family photo.

to a delightful redesign and a dash of new functionality. With the 5c, Apple achieves an unprecedented level of synergy between hardware and software. Like many of the company's other products, you have to experience the 5c in person to truly appreciate it.

Given the choice, there are only a few things we'd tweak. We're happy with the iPhone 5c in terms of performance and battery life, but we're longing for a better camera and a larger screen. The iPhone 5s addresses the former, but typing on any iPhone





will pick the iPhone 5c for the price and color choices alone, while the iPhone 5s will appeal to power users and gamers. iPhone 5 owners are probably better off sticking with iOS 7 or picking up an iPhone 5s instead of getting an iPhone 5c. And, if all else fails, there are always next year's iPhones. **D**

feels awfully cramped when you're used to displays that measure 4.3 inches (and bigger, even). Maybe next time? If you're using an iPhone 4s or anything older, you can't go wrong upgrading to either the 5c or the iPhone 5s. We think most buyers

Brad Molen and Edgar Alvarez contributed to this review.

Myriam was born wearing combat boots and holding a keyboard; moments later she picked up a soldering iron. She's been stomping, typing and hacking ever since.

BOTTOMLINE

iPhone 5c

\$99+
(ON CONTRACT)



PROS

- Gorgeous design
- Beautiful colors and craftsmanship
- Global LTE support
- Most affordable new iPhone yet

CONS

- Last year's internals
- Camera stumbles in low light

BOTTOMLINE

The iPhone 5c might not be cheap, but it's a gorgeous handset that brings a breath of fresh air to the iPhone lineup. For many people, it might even be a better choice than the iPhone 5s.



iPhone 5s



Will a wealth of new internals, redesigned OS and Touch ID make the **iPhone 5s** another must-have flagship for the Apple faithful?
By Myriam Joire

Forward-thinking. It's ironic that Apple's marketing slogan for the iPhone 5s invites us to look ahead to the future when, from the outside, the device looks like a carbon copy of last year's model, the iPhone 5. But just like any other odd-year iPhone — the "S" version, if you will — the 5s plays the *Transformers* card by offering more than meets the eye, with a few key improvements on the inside.

Though it's easy to dismiss this handset as iterative, the 5s is the first smartphone with full 64-bit support and a capacitive fingerprint sensor,



and it also ships with a fresh, revamped version of iOS. This might not matter to folks who were content with the status quo, but it matters a lot to Apple — and to the company’s future as well — especially if it wants to fend off an increasingly fierce pack of competitors. But is a “forward-thinking” phone worth the investment *today*?

HARDWARE

Last year’s iPhone 5 reveal was a showy affair meant to highlight Apple’s new industrial design and taller screen (if you recall, the company went so far as to raise the phone onto a pedestal, accompanied by a generous helping of sparkling lights).

A dual-LED flash on the back labels the 5s beside an iPhone 5.

There was no spectacle made of the 5s this year, since the flagship looks virtually the same as its predecessor. Basically, if you fell in love with the iPhone 5’s aluminum chassis and chamfered edges, you’re in for more of the same here. (Time will tell if this also means that the 5s is just as susceptible to dings and scratches as the iPhone 5; Apple tells us this year’s selection of colors are more “metallic,” and that will help them wear better. We’ll see.)

Unless you’re a hardcore Apple fan who’s taken the time to memorize all the minor differences separating the iPhone 5 and 5s, you’re likely to mistake the two at first glance. Not only is every button and port in the same place, but the phone’s



The 5s is to the iPhone 5 as the 4s was to the iPhone 4.

measurements remain unchanged as well: at 123.8 x 58.6 x 7.6mm (4.87 x 2.31 x 0.3 inches). It even weighs the same, at 112g (3.95 ounces). Likewise, the 5s also features a 4-inch, 1,136 x 640 Retina display with a pixel density of 326 pixels per inch, a brightness rating of 500 nits and an 800:1 contrast ratio. Again, more of the same. Clearly, Apple's still satisfied with the resolution and screen size, though we wonder if the company will have a change of heart with next year's flagship.

As you're probably well aware, the 5s is to the iPhone 5 as the 4s was to the iPhone 4 (and as the 3GS was to the 3G). All told, this is the third time in Apple's seven-year smartphone history that it's carried over the iPhone's design into a second consecutive year. Even so, the design isn't identical. Of all the enhancements made to the 5s, the most notable has to be the new Touch ID fingerprint scanner, which is embedded directly into the home button. Look closely and

you'll also notice a dual-LED flash on the back, as well as the word "iPhone" in a slightly lighter font near the bottom of the rear to match the look of iOS 7. Under the hood, the 5s steps up from Apple's A6 chip to the A7, the first smartphone processor with 64-bit support. Additionally, it claims to double the iPhone 5's CPU and GPU performance, thanks in part to a new coprocessor called the M7, which is meant to relieve the main processor when it comes to measuring motion data. Lastly, the 5s introduces an improved iSight rear camera and FaceTime HD front-facing shooter, but we'll get to that later in the review.

That leaves one severely underrated improvement: the 5s' global LTE support. In total, Apple

Its aluminum skin is said to wear better this time around.



will offer the device in four different SKUs, each designed for different regions and mobile operators. The widest-reaching of the bunch — the A1453 — supports 13 LTE bands, in addition to penta-band DC-HSPA, quad-band GSM / EDGE and even quad-band CDMA / EVDO rev. A / B. In fact, this version can technically work on all four major US LTE networks. Apple tells us this model will be sold locked on Sprint, but don't expect to see an unlocked A1453 in the US anytime soon — that honor will go to the A1533 GSM version. The A1533 will come in GSM and CDMA flavors, and will be sold on AT&T, T-Mobile and Verizon. Each one will have 11 LTE bands (yes, it'll include support for all four major US LTE networks as well). Meanwhile, the A1457 is destined for Europe, while the A1530 is tailored for Asia; neither one has US LTE support. As a sidenote, the 5c will also be offered in four models and will support the same bands.

Rounding out the spec list, the iPhone 5s features Bluetooth 4.0, aGPS and GLONASS for navigation, dual-band 802.11a/b/g/n (no ac support this time around) and options for 16, 32 or 64GB of built-in storage. As expected, it doesn't come with NFC, wireless charging or a microSD slot. It also comes in three color options, including silver (just like on the iPhone 5), space gray (gunmetal gray with black highlights on the top and bottom) and, of course, gold. Unsurprisingly, that gold model has received the lion's share of the attention, even since before it was

officially revealed. After all that, though, it's much subtler than we ever expected. What we're saying is, while our review unit was silver, we definitely would not have minded taking one in gold.

TOUCH ID

There's a reason you don't often see fingerprint scanners in smartphones: in the past, they've proven to be unreliable, often causing more aggravation than they're worth. In particular, we're thinking of the Motorola Atrix 4G, which featured an optical capacitive fingerprint scanner that required you to swipe your finger over the sensor, often several times, and with minimal success. But now here's the iPhone 5s, with a most intriguing — and perhaps most controversial — feature: its Touch ID biometric sensor. So are users in for the same frustration?

As it turns out, not really. In a clever move, Apple integrated a state-of-the-art capacitive fingerprint sensor into the home button itself and protected it with a sturdy sapphire crystal overlay. It's embedded so well, in fact, that the giveaway that it's a fingerprint reader is the silver ring encircling the sensor. That steel ring acts as a trigger, which detects your finger and then initiates the scan. Once it's activated, the sensor is capable of taking high-resolution pictures of your fingerprint from any angle, which it then sends back to the A7 chip for analysis. The images captured by the scanner show the first layer of skin



beneath the dead cells sitting on top, rendered at a stunning 500 ppi.

The setup process is simple: it typically took us less than a minute for the phone to learn our prints. The phone can memorize up to five different fingers (or thumbs), and they can belong to the same person or multiple people, depending on how many friends and family members you'd like to grant access. The training process may sound cumbersome at first, but it gets easier after just a few tries. First, you start by placing your finger on the home button several times — it usually took us six or seven repeats — and then, once the phone has enough information, it asks you to put your finger on the button at different angles. This can be done by rolling your finger from one side to another, or lifting your finger on and off a few times. After that, you'll see the final version added to your list of learned prints — fortunately, you can rename each one so you don't forget which one is which. In the rare case that the scanner isn't able to read your finger, you'll need to set a passcode to ensure you can still get into your phone.

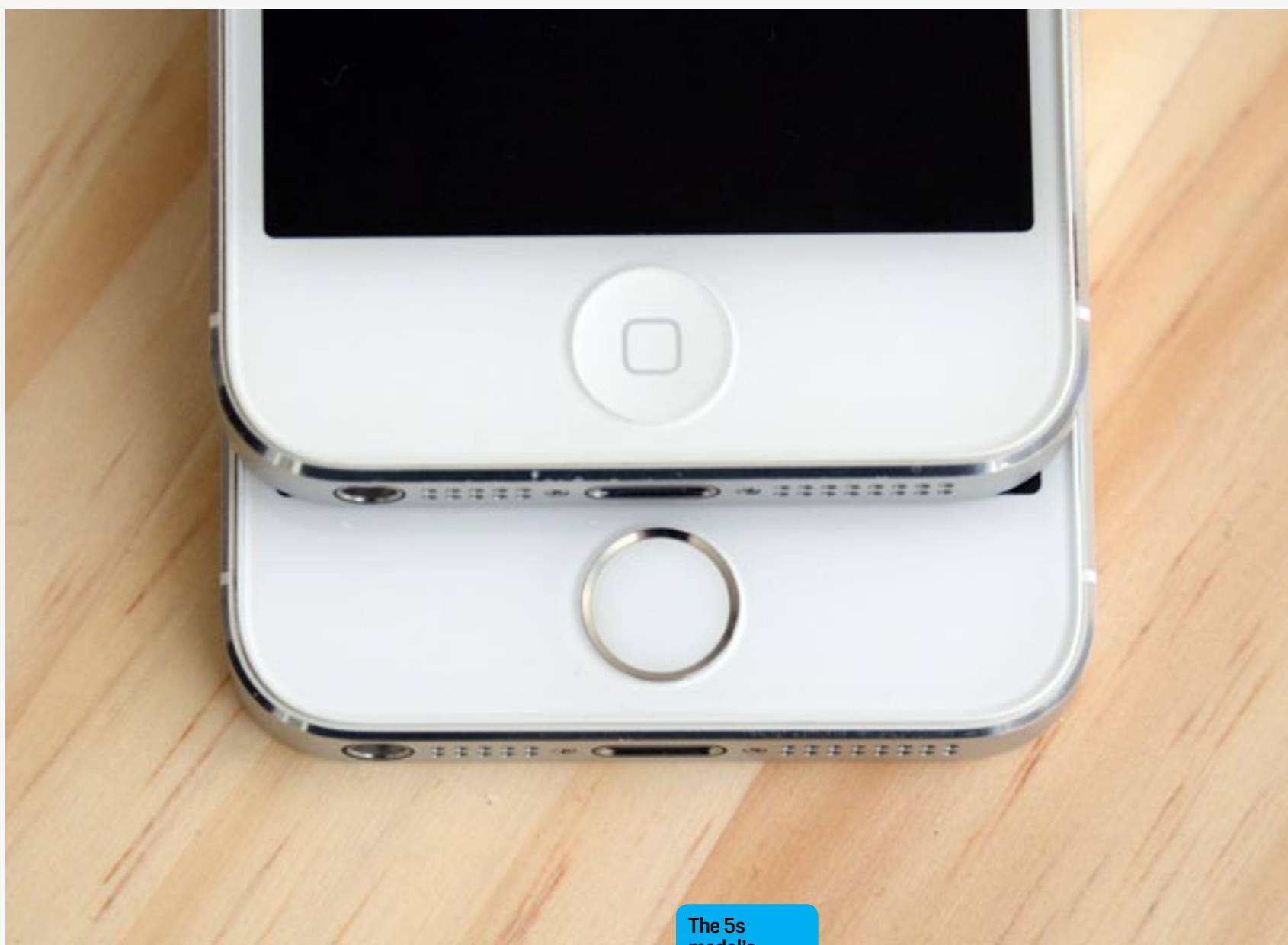
Sure, fingerprint scanners are cool to geeks like us, but are they really useful, or are they just a gimmick? Perhaps they're a little of both, and besides, nobody's going to force you to use it if you prefer a standard passcode or the ol' slide-to-unlock gesture. However, Touch ID is meant to give your phone



an added layer of protection (provided you didn't already have a passcode, of course) while shaving a couple seconds off the unlock process. It also comes in handy for purchasing iTunes content: you can buy apps, music, books and more without having to type the entire password in each time.

And it is indeed fast: the scanner was able to pick up all of our fingers in fractions of a second and from any angle. It's so natural, in fact, that we





The 5s model's Touch ID ring is a design change, too.

almost forgot that passwords and unlock screens even existed on the 5s; on countless occasions we tried to unlock the iPhone 5 and 5c with the scanner before realizing that we had to use the “old-fashioned” slide-to-unlock method. It’s not perfect, however: the scanner didn’t work when our fingers were wet or only partially on the home button, although we didn’t experience any problems with clammy fingers in humid conditions. Fun fact — it also technically works with toes, though we’re not sure why you would want to do that.

There are still some privacy concerns, which Apple has addressed by

stating that all of its captured fingerprints are converted into a digital signature, which is then encrypted and stored in just one specific section of the A7 chip. In other words, it doesn’t get uploaded to Apple’s servers or to iCloud. And — not that we expect this gruesome a fate — chopping off someone’s fingers won’t work, either; sorry, enterprising thieves, the sensor can only pick up living tissue. Additionally, you’ll have to enter the passcode if your device has been rebooted, or if you haven’t unlocked it in more than 48 hours.

With that said, we were disappoint-



ed to see that there isn't a way to require both a fingerprint *and* a passcode; a conventional string of numbers would offer an optional second security layer for those who don't yet trust Touch ID. We'd also like to see Apple open up the API, since there are plenty of app developers just waiting to take advantage of this feature.

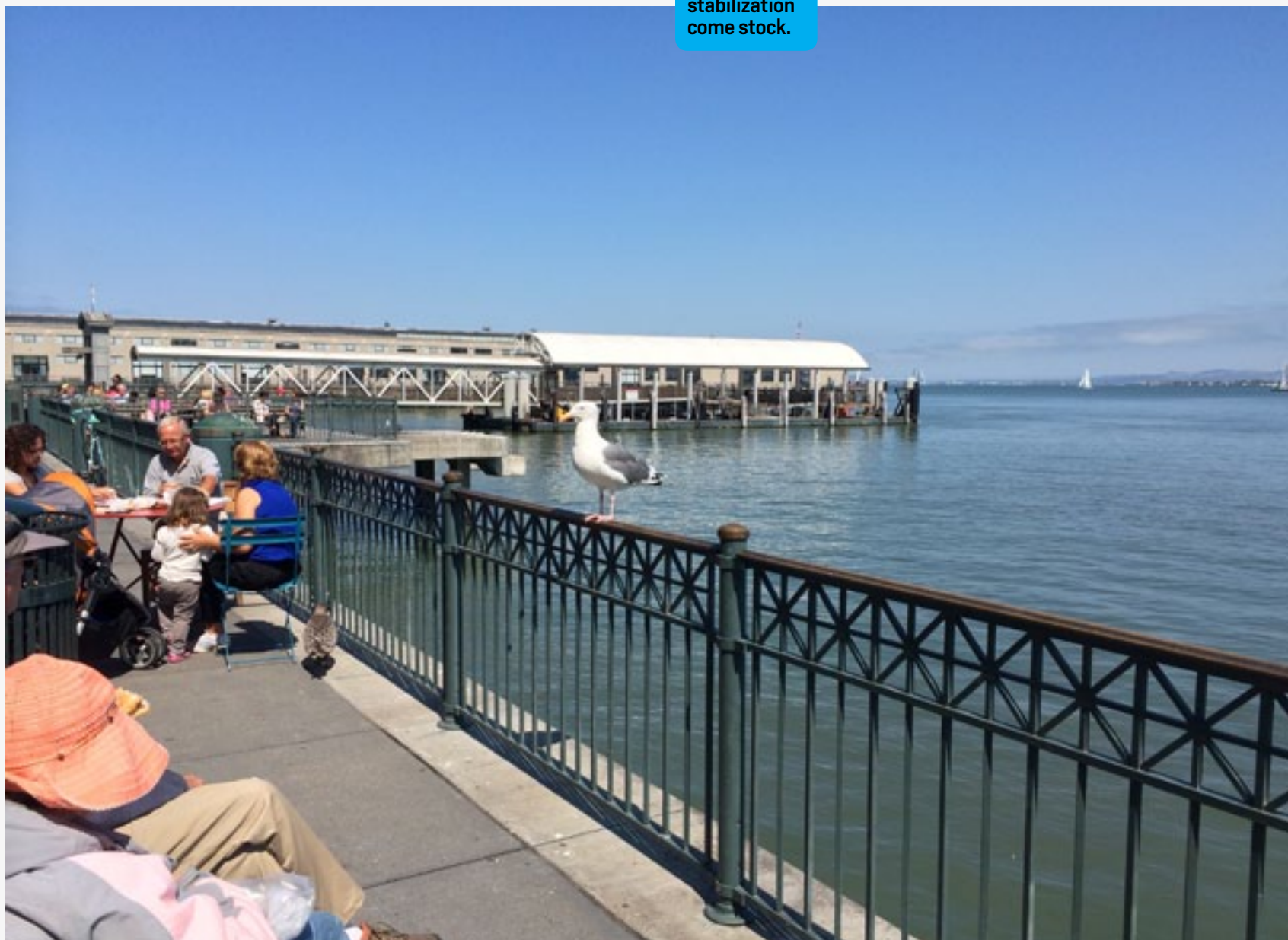
CAMERA

Apple has always taken an interesting stance on the iPhone's imaging capabilities: make it good, but keep it simple. This is in stark contrast to Android and Windows Phone flagships, all of which

Apple has always taken an interesting stance on the iPhone's imaging capabilities: make it good, but keep it simple.

boast tons of customization options, along with more unique features. Think UltraPixels, ClearPixel, PureView and so on. This isn't Apple's way, like it or not, but for people

Burst shooting and photo stabilization come stock.





This iPhone remains a great camera option when on the go.

who buy iPhones, the company's imaging prowess seems more than sufficient.

Like the iPhone 5 and 4s before it, the iSight rear camera in the 5s offers a maximum resolution of eight megapixels. However, it benefits from a larger pixel size (1.5 μ m vs. 1.4 μ m) and lower aperture (f/2.2 vs. f/2.4). Between those two improvements, Apple claims the 5s benefits from a 33 percent increase in light sensitivity. In other words, your daylight shots won't be any more detailed than they were before, but pictures you take in dimmer settings will be a clear improvement over what you're used to on the iPhone 5. In

theory, at least. But does the 5s camera live up to

Apple's promises?

First, let's tackle the camera's low-light performance. The shots we took with the 5s were consistently better than what we took with the 5: they were sharper, with finer details, more natural colors and far less noise. As you might expect, our daylight shots were roughly on par, though there were a few times when the 5s won out by a slight margin, offering just a little more detail. All told, the 5s plays in the same league as all those other flagships with a bigger emphasis on imaging. Even so, our



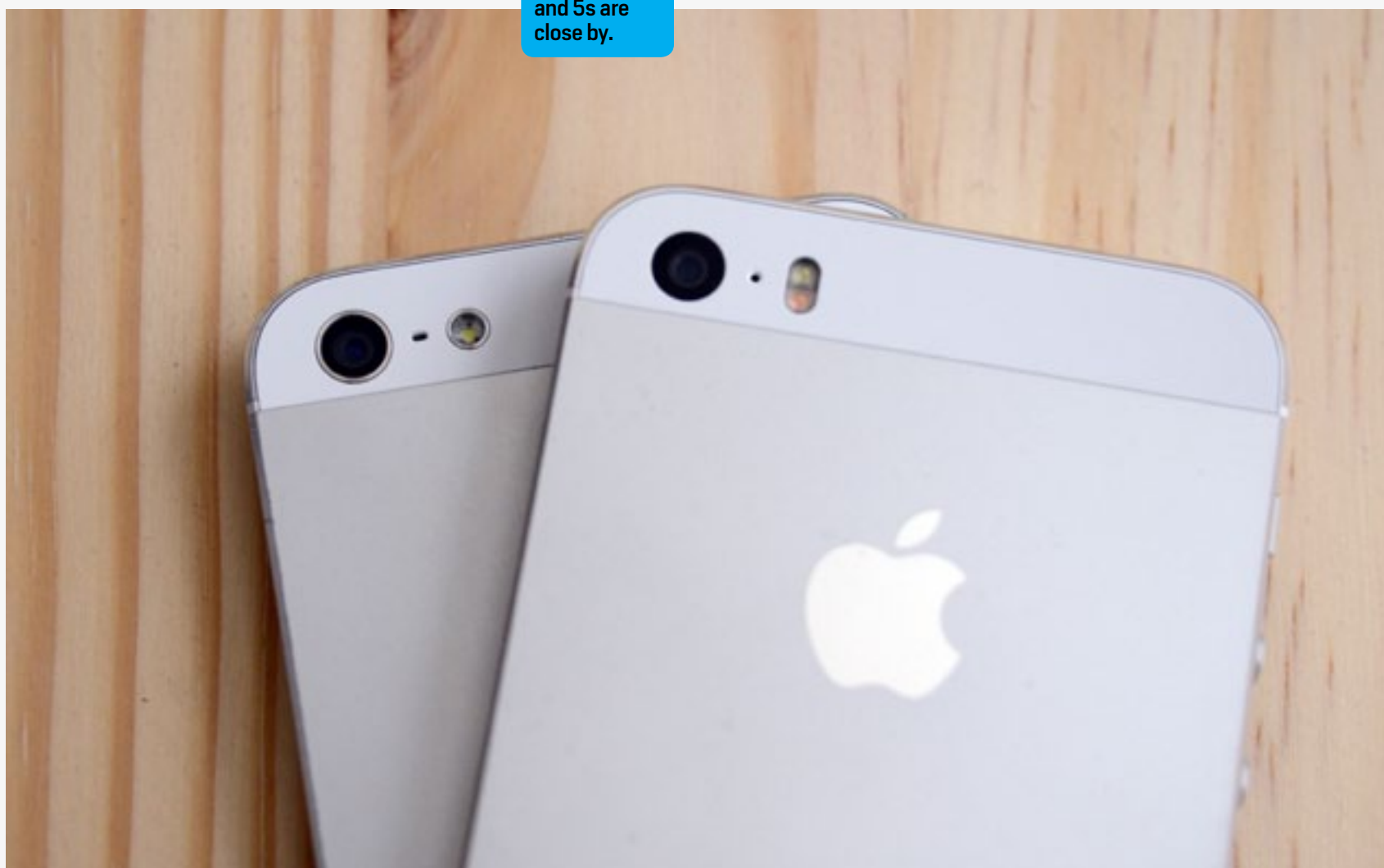
sample shots still showed more noise and less detail than the same images taken with the Nokia Lumia 1020. The 5s also does a good job of reproducing color, but it's not the best performer in this category, either. Make no mistake, though: the iPhone has been — and continues to be — great as a simple grab-and-go camera. It may not be a best-in-class performer, but the vast majority of users will still be happy.

The new camera also features auto image stabilization, which is designed to sharpen low-light shots by taking four images in a row, each with a short exposure time, and combining the sharpest parts of each individual shot. Thanks to the new ISP built into Apple's A7 chip, the

camera's stabilization feature is just one of several improvements on the menu here. The phone can now handle burst shooting at a rate of up to 10 images per second. These pictures are then compiled into a handy folder contained within the Photo Stream; just select the edit option to open up the full spread. The phone analyzes different parameters in each picture, such as exposure, sharpness and face detection information and takes a good guess as to which ones are the best. Panorama mode is faster on the 5s as well: it now promises up to a 50 percent increase in speed, but more importantly, it's now able to adjust exposure automatically as you pan around.

As we said earlier, one of the only

New colors are evident when the 5 and 5s are close by.



cosmetic changes to the iPhone is the addition of a dual-LED flash known as True Tone. The setup consists of a white and amber flash, which the phone uses to analyze the ambient color temperature and determine the intensity at which to fire each LED to match that specific temperature. As a result, our images showed more natural colors — and that was true for both still-life shots and human subjects.

The FaceTime HD front-facing camera also received an upgrade for 2013. Like last time, it's a 1.2-megapixel shooter capable of 720p video, but the 5s features a BSI sensor with larger 1.9 μ m pixels and does a modestly better job of capturing light. Indeed, in side-by-side comparisons, this reviewer's face had more pronounced shadows on last year's iPhone compared to this year's.

DSLRs and flagship phones have been doing slow-motion video for a long time, but most (if not all) of them have only been able to produce footage at a maximum of 60 fps. We also haven't seen any smartphones able to switch back and forth between slow-mo and normal speed in the same movie. (The HTC One actually has this ability, though not at 120 fps.) Enter the iPhone 5s, which can capture 120 fps video and then lets you determine what parts of that footage are displayed in slow motion (two on-screen scrubbers make this easy). Videos uploaded and shared through YouTube will show up with your slow-mo intact, although

movies transferred to your computer normally won't. We'll admit, we had a lot more fun with this feature than any human ought to have.

Video is recorded in MPEG-4 format and at a resolution of 1080p. The sample footage we caught had an overall bit rate of 16.4 Mbps and a 30 fps frame rate. The mic picked up our voice clearly, though city noise in the background was still a little louder than we'd like. As for the videos, most of the samples we took actually looked like they were HD-quality. How 'bout that?

PERFORMANCE AND BATTERY LIFE

Ever since the first iPhone came out in 2007, Apple has declined to clarify many of its handsets' specs, often keeping them a secret until teardowns revealed the truth. The company believes there's no need to focus on those details when the user experience matters more. Of course, that doesn't mean it isn't above claiming bragging rights now and again. Case in point: the new dual-core A7 SoC embedded within the iPhone 5s.

The A7 implements the ARMv8 instruction set, which means it's the first smartphone to feature the sort of 64-bit architecture currently used on desktops. But what does this mean, exactly, and why does it matter? In the most basic terms, it means games and processor-intensive apps that support 64-bit will perform much better and won't drain the battery quite as fast; even regular apps are capable of execut-



The iPhone 5 may be fast enough for some, but the 5s is significantly faster.

ing operations faster, since they can take place without the processor digging into main memory. On top of this, Apple claims the A7 offers double the processing power and graphics performance as the A6. What's more, iOS 7 was built with 64-bit support in mind, allowing greater efficiency for developers. In particular, native 64-bit libraries, kernel and drivers are all included in the new firmware, and devs can start tweaking their code right away to take advantage of it.

Of course, one of the major benefits of 64-bit desktops is support for more than 4GB of RAM, which isn't something we'll be worrying about on the iPhone for a while yet — system apps indicate that the 5s still has only 1GB. Regardless, we can't see any reason *not* to add 64-bit support this early in the game; most apps will enjoy a boost in performance and / or battery life, and it also encourages the competition to get into the game as well. Samsung, for instance, has confirmed that it's working on 64-bit support, and there's speculation that Android 4.4 will add native support for it as well. Whether this paves the way for a convergence between iOS and OS X, we don't know;

at the very least, this makes it easier for OS X devs to transfer their apps to the iPhone (as well as the next iPad, assuming it also gets 64-bit support).

Since iOS 7 hasn't officially been out for long, we haven't had much opportunity to play with any games or use apps that have been upgraded for 64-bit, but that doesn't mean we aren't already seeing the benefits of the A7. In general, the 5s is noticeably speedier; apps load faster and everything just feels zip-pier. The greatest improvement, however, is in gaming. Not only is gameplay smoother, but also cutaway scenes in between missions load faster and look better. As an example, we played *Infinity Blade II* on the iPhone 5 and then the 5s, and were amazed to see that we'd missed out on minute-long sections of the animation on the older device because of regular frame-freezes. Needless to say, this was never a problem on the 5s. On top of this, the GPU now offers support for OpenGL ES 3.0, a standard that should give game companies the ability to add more complex details and make their titles look much more realistic.

Our impressions of the A7 were more subjective in nature, of course, so we ran a few benchmarks to show the difference between iPhones in more quantitative terms.

The iPhone 5 may be fast enough for some, but the 5s is significantly faster. In a few tests, the 5s performed more than three times better, while in others, it was



BENCHMARKS	iPhone 5s	NVIDIA SHIELD	LG G2
SUNSPIDER 1.0.1 (MS)	418	513	880*
GLBENCH 2.7 T-REX HD OFFSCREEN (FPS)	23	24	21
BASEMARK X (ONSCREEN / OFFSCREEN)	27.7 / 16.7	24.8 / 12.4	14.8 / 12.8
3DMARK ICE STORM UNLIMITED	13,729	12,579	16,619**
GEEKBENCH 3.0 (MULTI-THREAD)	2,562	2,715	2,140
LINPACK	795	680	611

*LG G2 SUNSPIDER SCORE IS AS SHOWN IN REVIEW; US MODELS VARY. **UPDATED RESULT.

closer to a 50 percent increase. Regardless, the 5s was the clear winner according to every single metric, whether it was CPU performance or JavaScript rendering. We also ran similar benchmarks on Android devices running the best chipsets: the NVIDIA Shield, which uses Tegra 4, and the LG G2, which is powered by a Snapdragon 800 chip.

Admittedly, these tests likely have a higher margin of error simply due to the fact that they're running on different platforms. Still, looking at these results, it's quite clear that the iPhone 5s — dual-core and all — can not only keep up with the best Android has to offer, it may also actually beat Tegra 4 and Snapdragon 800 in certain scenarios.

The A7 isn't the only new piece of silicon finding a home inside the iPhone

5s. Apple's also thrown in a coprocessor called the M7, which is a dedicated motion tracker designed to lighten the A7's load and conserve battery life. The idea of using coprocessors for specific types of tasks isn't new: the X8 architecture found within the Moto X, and other recent Motorola handsets, features two such cores for natural-language processing and contextual computing. Apple's approach is to have the M7 control motion data from the gyroscope, accelerometer and compass inside the iPhone. Your fitness apps will take up less battery life when running in the background. Additionally, since the M7 knows when you're walking, driving or running, the iPhone won't actively search for available WiFi networks while you're in a moving vehicle.



We imagine the M7 will have far more clever applications than simply saving battery life. Here's one: navigation apps, such as Apple Maps, can sense when you stop driving and begin walking, and Maps will automatically transition your route from displaying driving directions to walking directions. We tested this claim, and got it to work as advertised; the only caveat we could see is that you'll need to walk a little while before the M7 determines that you actually are walking and not just stopping at a gas station or rest stop. This could have great benefits for indoor mapping, finding your lost car and automation (imagine the iPhone being able to sense that you've set your phone next to your bed and switching to Do Not Disturb mode automatically). The M7 may not do much yet, but developers will have access to the CoreMotion API, which means we probably won't have to wait long before we see an onslaught of apps that take advantage of that new coprocessor.

All this talk about the A7 and M7 joining forces to save power brings us to one of the more important topics of any smartphone review: battery life. Apple never publicly discusses the size of its batteries, but *Anandtech's* Brian Klug pored over the new iPhone's FCC docs and concluded that we're looking at a 10 percent increase in capacity — a 1,580mAh (5.96Whr) cell versus 1,440mAh (5.45Whr) in the iPhone 5.

Compared to some Android flagships

that doesn't sound like much, but it still amounts to a serious improvement in battery life. We started with our standard video rundown test, which entails looping an HD video at half brightness. The iPhone 5s made it through 10 hours and 50 minutes of playback — even better than Apple's 10-hour claim — while the iPhone 5 cut out after nine hours and 17 minutes. With heavy usage (copious email, navigation, social networking, web browsing, calls and taking pictures and videos), we managed a little over eight hours before the 5s was ready to call it quits. On a day of what we consider to be normal usage, however (this varies by user, naturally), we had no problem getting through a full workday with extra juice to spare. You'll still need to charge it up every night — or sooner than that, depending on your use — but its runtime is at least above average. As an aside, it only took an hour and 50 minutes for the iPhone 5s to charge to full capacity using the supplied charger.

When making calls on the 5s, our friends on the other end of the line always sounded crisp. For their part, callers told us they could barely hear traffic and city noise, even when we were talking in exceptionally loud areas. The phone quickly and easily located a GPS signal, and we never ran into any problems navigating.

SOFTWARE

The iPhone 5s (and 5c) will ship with iOS 7, and if you haven't heard, it's



Siri shed the beta tag and got an extra voice with a few new abilities.

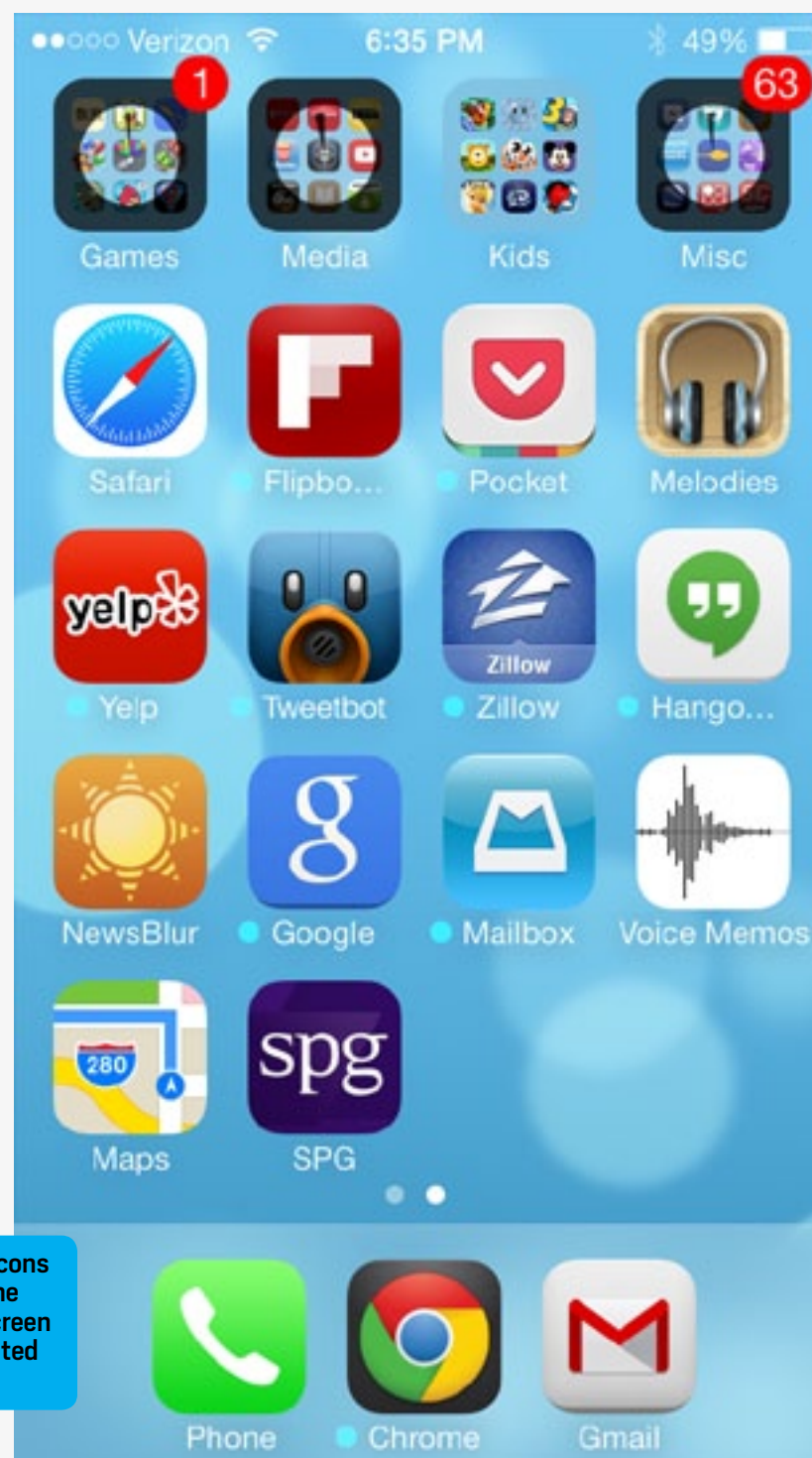
a doozy. The post-Forstall era looks pretty promising, but it's not going to be universally loved. Us? In general, we like it. In iOS 7, Sir Jony Ive chose to eschew the traditional skeuomorphic interface in favor of one that's flatter and more colorful. We're going to have a full review up on the site soon, but we'd like to at least cover some of the OS's key features now.

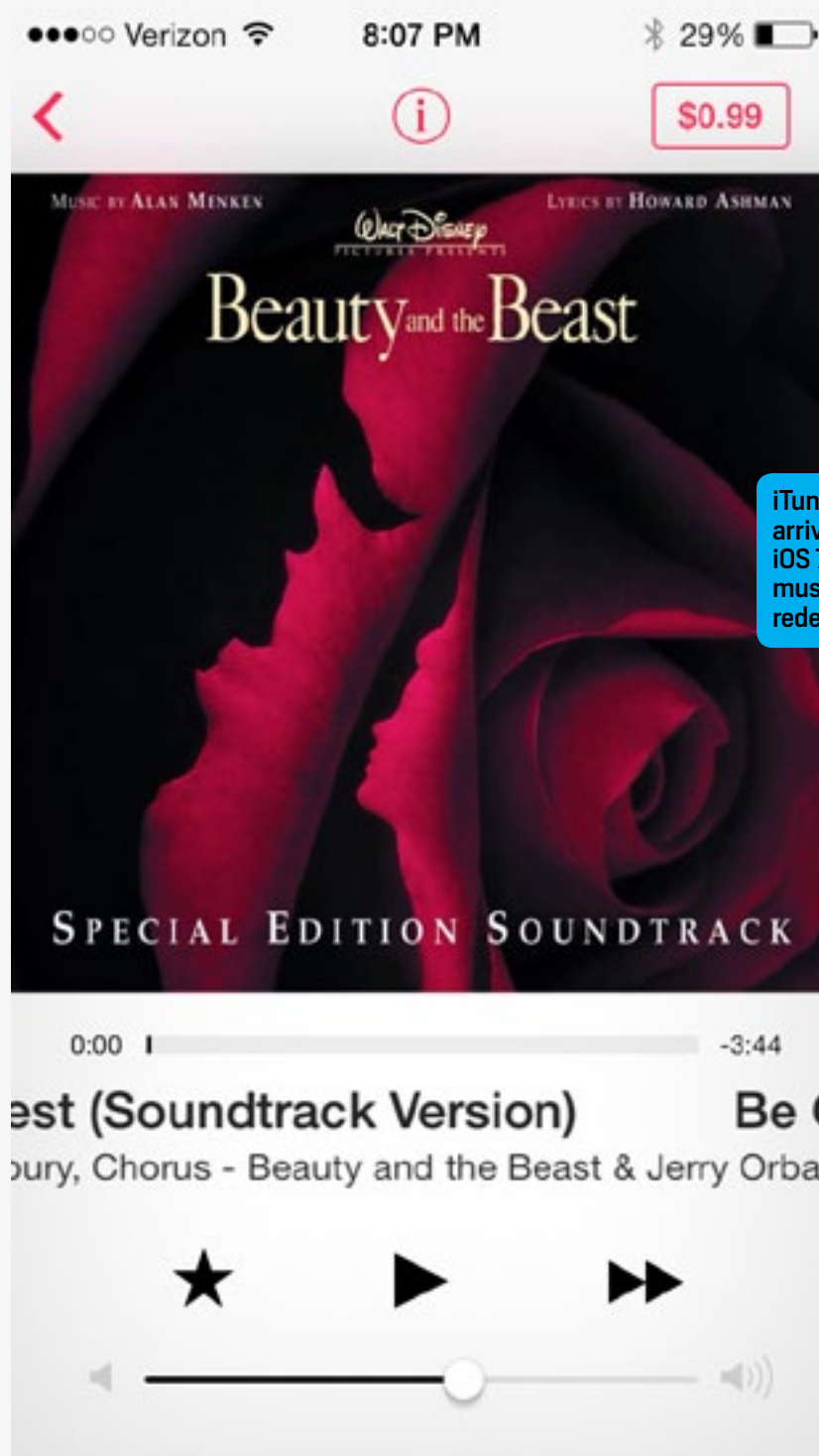
The actual mechanics behind the user interface have changed very little, which means that most iOS users will easily be able to find their way around the phone. The cosmetic differences, on the other hand, are drastic indeed. New fonts, icons, colors, graphics and gestures abound; the keyboard sports a new look, as do most of the core apps. Spotlight is accessible from every panel now with a small downward tug on the screen; folders can hold a lot more apps; Siri shed the beta tag and got an extra voice with a few new abilities; physics and layers add a new dimension to the UI; and you can even get dynamic wallpapers with parallax.

Our favorite improvement to iOS is Control Center, a feature that's been on our wish list for years. Instead of fumbling

through multiple settings menus to find what you need, a simple swipe up from the bottom of the phone brings up a panel with toggle buttons; a brightness slider; quick-access shortcuts to flashlight, alarms, calculator and camera; and a music player widget. It's a huge timesaver, but if there's one thing we could add, it would be the ability to customize this panel to our liking.

Multitasking gets a completely new look, and as you might have heard, it ap-





appears to take cues from webOS, Windows Phone and even Sense 4. Instead of pulling up a small bar of background apps that are difficult to kill, iOS 7's method is now card-based: it lets you glance at screenshots of recent apps, which you can swipe to get rid of. Sadly, it's missing a "clear all" option, which means anyone who really cares to clean up is still left with no choice but to address items one by one or reboot the phone.

The music app received a face-lift

too, but the biggest addition to the app is iTunes Radio. It's a lot like Pandora: you can listen to preset stations or create your own, and each station picks which songs are played. Just like with Pandora, you can fine-tune your preferences as you go along, but watch out for the skips — you're only allowed to skip six songs per hour for any given station.

There's also AirDrop, which is basically a fancy name for file sharing. The feature gives you the ability to shoot pictures, videos and other files over to another iOS device in the vicinity; the icon shows up in the share menu and you can choose if you want to share files with everyone or only with people in your contacts list.

THE COMPETITION

The iPhone 5s comes in three size selections: the 16GB version is \$649 unlocked; the 32GB variant costs \$749; and the 64GB model is priced at \$849. Most carriers in the US will offer the devices starting at \$199 with a two-year commitment, though you can also choose plans that allow you to get the iPhone for free — provided you pay installments each month to cover the full cost of the device. The 5c, which essentially has the same components as the iPhone 5 (albeit with better LTE support), will sell for \$100 less, and the iPhone 4s can be yours for \$0 on contract.

Naturally, the iPhone seems to be a benchmark for price comparisons, so



let's see how it stacks up against some of the other flagships. In the US, the \$200 16GB model has fiercer competition than it's seen in previous years. If you're not locked into the iOS ecosystem, Android has a handful of top contenders at the same price, including the Samsung Galaxy S 4, the HTC One, LG G2 and Moto X. If you're adventurous enough to consider joining the Windows Phone side, you can get the Nokia Lumia 1020 on AT&T for the same price as the iPhone.

WRAP-UP

Is the 5s the best iPhone ever made? Yes, though that shouldn't come as a surprise. Apple took a good product and made it better through hardware upgrades, new

features and completely revamped software. In what would otherwise be considered a mundane update to the iPhone 5, Apple somehow managed to appeal to both the geek (64-bit support, M7 coprocessor, Touch ID) and the average Joe (a fresh, colorful iOS 7), all while laying the groundwork for the company's future.

Thanks to the introduction of the iPhone 5c, potential iPhone buyers now have another option to consider. If you want the latest and greatest, the 5s is clearly your best bet. Those content with owning a device like the iPhone 5 for a lower price (and those who love the color choices) will prefer the 5c.

Frankly, though, if you currently own a 5, it's hard to

Unlike years past, there are now options for a new iPhone.



justify coughing up the extra cash for an early upgrade to get either one.

And what if you're not sold on iOS? If you haven't seriously considered an iPhone before, there likely isn't much in the 5s to make you change your mind. For anyone who needs copious amounts of screen space, a 4-inch display likely won't cut it, but to be fair, the 5s is the best small phone you can get — we can't think of any other device with a display smaller than 4.5 inches that even comes close. The 64-bit support on the A7 may convince a few power users to make the transition from Android to iOS, but otherwise, the SoC is on par with what you'll find in some of the top competing smartphones. Because of this, there's not much incentive for

the Google faithful to make the switch, especially if they are already invested in the Android ecosystem.

The 5s is a solid effort from Apple, but its true worth is yet to be determined. If developers come up with clever ways to take advantage of the M7 coprocessor and the 64-bit support in iOS 7, the 5s will truly shine. If not, many people might just wait it out another year. **D**

Brad Molen and Edgar Alvarez contributed to this review.

Myriam was born wearing combat boots and holding a keyboard; moments later she picked up a soldering iron. She's been stomping, typing and hacking ever since.

BOTTOMLINE

**APPLE
iPhone 5s**

\$199+
(ON CONTRACT)

**PROS**

- A7 chip offers fast performance and 64-bit support
- Touch ID works as advertised
- Global LTE support
- Improved camera

CONS

- Last year's design
- Touch ID needs third-party support

BOTTOMLINE

The iPhone 5s is an evolution of the iPhone 5, and isn't necessarily a must-have. It ushers in new technologies that will soon be standard on all of Apple's devices. While most consumers will be happy with the 5c, the 5s is better-suited for gamers and power users.





Facts. Sources. Discounts.
It pays to double check them all.

Do a Discount Double Check[®]
and get discounts up to 40%*
on auto insurance.

Get A Quote ►

*Not available in all states.

ESCC

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TOYOTA





VISUALIZED

**DIGITAL GROTESQUE —
3D ARCHITECTURE**



MICHAEL HANSMEYER AND BENJAMIN DILLENBURGER





VISUALIZED

DIGITAL GROTESQUE — 3D ARCHITECTURE

Yes, 3D printing has hit the world by storm, yielding ABS items from bracelets to full-size cars, but human-scale construction possibilities are still being explored. Architects Michael Hansmeyer and Benjamin Dillenburger have used their computational design method — employing recursive division to go from simple geometrics to highly complex structures — and created Digital Grotesque. They've achieved this relatively low-cost and structurally sound 10-foot high, 172-square-foot construction by assembling sections fabricated with sand-printing technology — an additive manufacturing process — and reinforced with a resin coating. The intricate and interwoven details of this "sand castle" go far beyond basic drafting capability and with this process, they were able to print the final product in a month, and with a resolution of one-tenth of a millimeter.



Steps in
making and
assembling
the final
product.

MICHAEL HANSMEYER AND BENJAMIN DILLENBURGER



JUDE MANSILLA



THE HEAD-FI.ORG FOUNDER **on anonymous angst and the** **apotheosis of audio gear**

What gadget do you depend on most?
Currently, it would have to be my iPhone. Of course, it's communications and data central. But it's also a portable media-playing and streaming rig that I can plug my second-most depended-on gadgets into — my headphones.

Which do you look back upon most fondly?

This one's a tie.

My Apple Newton MessagePad 2100 was the most personal computer I've ever owned — which is easy for former Newton die-hards to understand, but almost impossible to explain to others.

My first good audio rig in the mid-'80s — a Sony D7 portable CD player and Sony MDR-V6



headphones — started me on the journey that turned into Head-Fi.org, so that system has to rank at or near the top for me, too.

Which company does the most to push the industry?

I'd have to say Apple. It popularized the personal computer and then they helped reinvent the category with the Lisa / Mac's GUI. Apple didn't invent the MP3 player or the smartphone, but their iPod and iPhone made everyone want an MP3 player and then a smartphone. It's transformed much of the business of music and entertainment, too. So while it may not always invent categories, it pushes the categories it enters like few (if any) others can.

Apple's Lisa [2], a machine that ran an early windows-based office computing system.



What is your operating system of choice?

Mac OS X on the desktop. iOS and Android on the go.

What are your favorite gadget names?

Any products by Schiit Audio. I've gotten to the point where I can say "Schiit Audio" and not snicker. But I haven't yet gotten to the point where I can keep from giggling a bit as others chortle when I say, "Schiit Audio." Schiit Audio.

What are your least favorite?

Letter-number or number-letter combos that I can't remember. Onkyo makes a new headphone (that's quite good, by the way) called the ES-HF300. I mean, really? It seems to me more companies are starting to name some of their products. Sennheiser's Momentum is a very good headphone with a name I can remember. (Sennheiser's still got a ways to go on names, though, as they still make another excellent headphone called the HD 25-1 II.)

Oh that brings me to another naming pet peeve: dangling a single letter or number out there. AKG K 550. Hyphen it up. Or just throw caution to the wind and unite that outcast letter with the numbers that follow: K550.



Which app do you depend on most?

DEVONthink Pro Office. I have a couple of Fujitsu document scanners, and I scan as much stuff as I can. And all of my scans go to DEVONthink as searchable PDF files, where I can search them, annotate them, look for related documents, etc. I also print directly to DEVONthink anything important or interesting I come across. Here's what's also cool about it: I keep my DEVONthink database on Dropbox, so my huge personal storehouse of info is accessible from all my computers. There's a lot more I do with it, too, so, yeah, DEVONthink Pro Office would have to be No. 1 for me.

What traits do you most deplore in a smartphone?

A small screen, laggy user interface and small or nonexistent app marketplace.

Which do you most admire?

Intuitive, lag-free user interface, an app marketplace vast enough

to address just about every need and whim I might have and a big, bright, sharp screen.

What is your idea of the perfect device?

My idea of the perfect device would be wildly far-fetched, with too many wish list features to get into here. For now, I'd settle for something like an iPhone 5s with a much larger screen.

What is your earliest gadget memory?

I remember when my parents brought home the Apple //e, and the excitement I felt, and the fantasies of *WarGames*-type mischief that filled my head. Though there were no hacking-into-government shenanigans, the desire to connect with others via the 300-baud modem was immediate and it wasn't long before we were dialing into bulletin board systems. I just remember the feeling of endless possibilities that came with that beige box of magic and its monochrome green screen monitor.

What technological advancement do you most admire?

Not including the obvious ones like electricity, telephone, automobiles, airplanes, the internet in general, etc., I'd have to say the first thing that comes to mind is the way geo-targeting has made

“I haven't yet gotten to the point where I can keep from giggling a bit as others chortle when I say ‘Schiit Audio.’”



apps and data far more useful, personal and in-the-moment.

I'm also amazed by how the standards that developed over time have resulted in us having information available that was far more proprietary in the past. If you wanted to track a package in the past, you could call the courier and they'd share, over the telephone, the tracking info they pulled up on their terminals — now that same information is directly accessible to us. The same goes for account and transaction info of all types, being able to check store inventory, etc.

“I know people who are anonymous raging maniacs and abusive trolls online, but shy and polite in person.”

Which do you most despise?

The ability to interact with countless others — and to be able to do so anonymously — is something that has come with advances in networking and social networking. One thing about that I despise is the abuse of anonymity. I value my privacy a great deal, but I don't abuse my ability to be anonymous. In other words,

my online personality is similar — perhaps identical — to my in-person personality. I know people who are anonymous raging maniacs and abusive trolls online, but shy and polite in person.

What fault are you most tolerant of in a gadget?

As much as I appreciate long battery life, I carry enough portable charging devices when I'm out and about to forgive a device's mediocre battery life.

Which are you most intolerant of?

Updates that make products worse. For example, I have a Plantronics Bluetooth headset that has a MagSafe-type connector for charging, which means I have to carry this little magnetic dongle with me if I want to charge my headset on the go (and I'm on the phone a lot). If I forget that dongle, I can't charge my headset. Was tripping over one's Bluetooth headset-charging cable a big problem that needed solving? Or did the designers just include it because it seemed hip? MagSafe makes sense to me for a laptop computer, but on a Bluetooth earpiece, it's just a nuisance. (The previous version of this headset allowed you to plug a micro-USB plug directly into it for charging, no additional dongle needed.)



“Being connected means freedom to work from almost anywhere, to collaborate with almost anyone...”

When has your smartphone been of the most help?

Whenever I’m somewhere new to me. I don’t know how I ever got to where I was going without phone navigation. (I’ve never owned a dedicated GPS device.) And speaking of new places, I use my phone (with the Urbanspoon app) to find good places to eat, looking for places with high ratings by a lot of people.

Also, in Tokyo with a bunch of friends with a tendency to wander, iPhone’s Find My Friends app was very helpful for bringing us back together without a fusillade of texts or calls between a half-dozen of us.

What device do you covet most?

The Sennheiser Orpheus. It was a very limited edition, electrostatic headphone system that originally sold for around \$13,000 in 1991, but can only be found used nowadays for around \$30,000 or more. The Sennheiser Orpheus system sounds glorious. At meets and events, I still get to hear the mighty

Orpheus from time to time and it never fails to amaze me.

If you could change one thing about your phone what would it be?

I carry both an iPhone 4s and a Samsung Galaxy S 4. For the iPhone 4s, I’d want a screen more like the Galaxy S 4’s. And for the S4, I’d swap Android for iOS.


What does being connected mean to you?

Being connected means freedom to work from almost anywhere, to collaborate with almost anyone and has helped me develop and nurture many close friendships I wouldn’t otherwise have.

When are you least likely to reply to an email?

When I’m asleep, on international flights or when my son asks me to put my phone away during dinner.

When did you last disconnect?

My most truly disconnected moment in the last 10 or so years was during the big Northeast blackout of 2003. The fact that the whole world was aware of the huge blackout made it the perfect excuse to be unreachable, off the grid. Being completely offline, I slept like a baby during the blackout. I haven’t felt such a complete sense of disconnectedness since. 



IN REAL LIFE is an ongoing feature where we talk about the gadgets, apps and toys we're using in real life.

CAMERA GRIP FOR NOKIA LUMIA 1020

THE ACCESSORIZING CONTINUES.

Not long after picking up a Nokia Lumia 1020, I sought out the optional camera grip, which adds, among other things, a tripod socket. After all, my return to the Windows Phone world had more to do with the amazing camera than, well, most anything else. So how does the camera grip perform for folks like me, who view the Lumia 1020 as a camera first and a smartphone second? Not too bad, really.

The grip covers the entire backside of the 1020, save for the protruding camera module. Installing it is a simple matter of sliding the phone in until its micro-USB port connects to the grip's base, then snapping two stubby arms that sort of hug the phone at the opposite end. That base provides a substantial handgrip with a strip of somewhat grippy rubber for your fingertips. Up top, you'll find a dedicated two-stage shutter button that's much larger than the one on the phone itself. The base also houses a 1,020mAh battery, which Nokia says is good for another 285 shots or 48 minutes of video.

The extra juice is a nice bonus that makes good use of the handgrip's added volume and provides some weight to give the accessory a nice balance.

I opted for the black camera grip for my banana yellow Lumia as I wanted to have a nice, dual-tone look (read: my local AT&T store didn't have yellow in stock and I didn't want to wait). The grip performs as advertised and the point-and-shoot ergonomics do come in handy when I'm using the 1020 almost exclusively as a camera.

It's certainly not something I'd keep attached to my phone 24/7, which makes me wish the removal process was a bit smoother. Those stubby arms cling for dear life to the phone's edges, and I've yet to devise a way to quickly and effortlessly pry them off. And while the tripod socket is a welcome addition, it's located on the extreme edge of the camera rather than lined up below the lens. Yes, I know that's not really feasible here, but it does cause problems when attaching it to certain equipment like, say, my ABR800 ringflash.

In all, the improved ergonomics and handy, if a bit oddly placed, tripod socket justify the \$59 price in my book. The additional battery power is certainly welcome too. It's not an everyday accessory, but the Camera Grip for Nokia Lumia 1020 has earned a spot in my gear bag. — *Philip Palermo*



The week that was in 140 characters or less

Beta Benchmark, Retro Revival and Equine Quackers

DISTRO
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ESC

REHASHED

@lymond

I'll know Siri is finally out of beta as soon as it can detect when I'm being sarcastic. Really!

@quanpants

According to Amazon, sales of vinyl records are up a whopping 745% since 2008. We're one step closer to bringing the rat tail back.

@JayskinnerinK

Blackberry just officially announced the Z30 (a 5in Z10) and I don't think anyone really noticed. You had a good run BB but... #endofanera

@doctorparadox

iOS 7.0 update progress: About a gabillion minutes remaining

@mikeisaac

would you rather fight 100 duck-sized horses, or 1 horse sized duck? RT @TheAtlantic Have a question for Mark Zuckerberg? what would it be?

THE STRIP

BY BOX BROWN

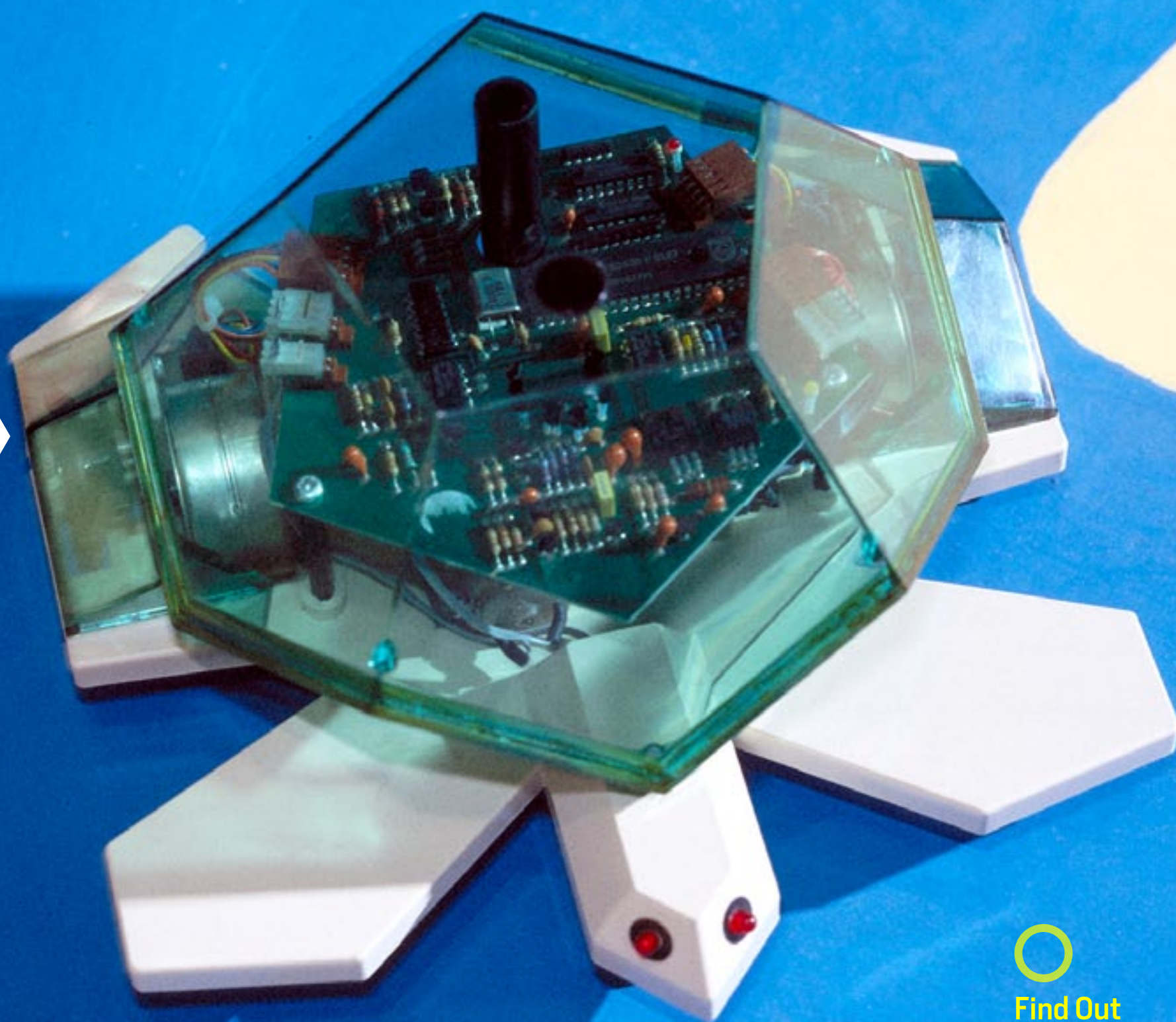


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TIME
MACHINES

WHAT IS THIS?
TOUCH TO FIND OUT



Find Out
More!



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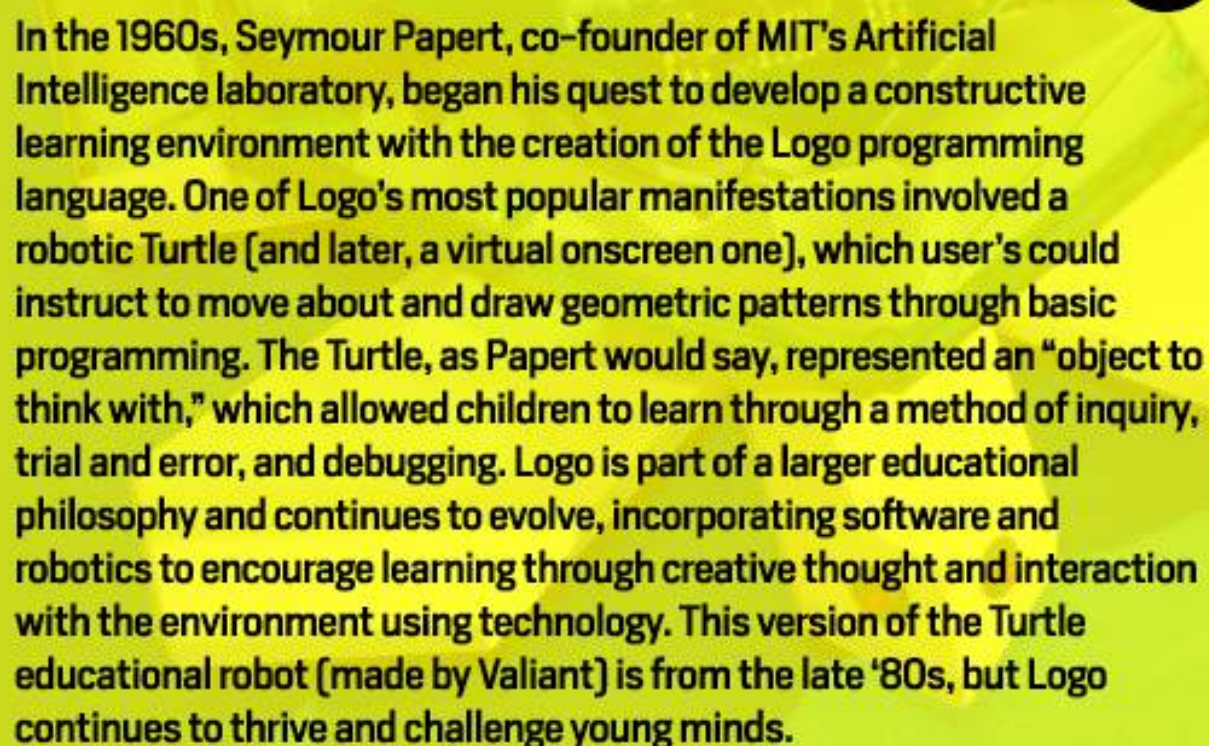
ESC

TIME
MACHINES

VALIANT TURTLE

MODERN EQUIVALENT:

Lego
Mindstorms EV3



In the 1960s, Seymour Papert, co-founder of MIT's Artificial Intelligence laboratory, began his quest to develop a constructive learning environment with the creation of the Logo programming language. One of Logo's most popular manifestations involved a robotic Turtle (and later, a virtual onscreen one), which user's could instruct to move about and draw geometric patterns through basic programming. The Turtle, as Papert would say, represented an "object to think with," which allowed children to learn through a method of inquiry, trial and error, and debugging. Logo is part of a larger educational philosophy and continues to evolve, incorporating software and robotics to encourage learning through creative thought and interaction with the environment using technology. This version of the Turtle educational robot (made by Valiant) is from the late '80s, but Logo continues to thrive and challenge young minds.

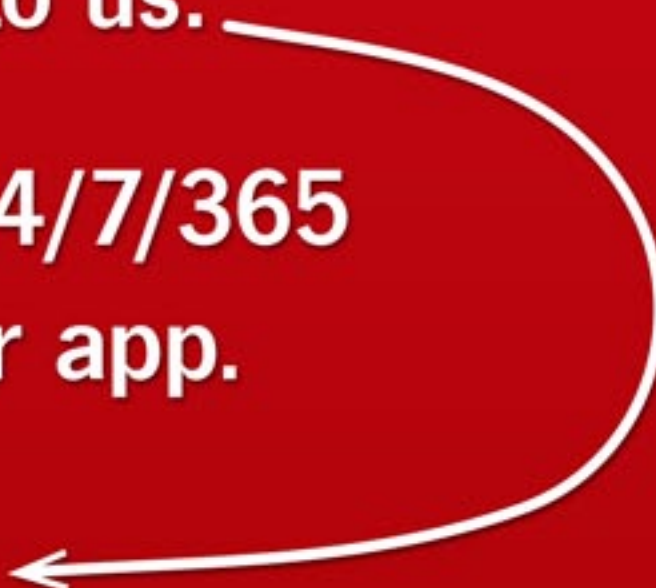
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